

A CHILTON

PUBLICATION

Industrial  
Furnaces

See page 111

NATIONAL METALWORKING WEEKLY February 25, 1954



it's Your

Q

**Quality** . . . that costs no more is yours when you choose Fairbanks-Morse Side Suction Centrifugal Pumps. Extensive engineering laboratories . . . production line methods with precision machining of all parts enable Fairbanks-Morse to offer you a side suction centrifugal with the design, workmanship and performance normally obtained only in highest quality split-case pumps.

Open type, single suction, high efficiency impeller

. . . ball-bearing frame construction for long life and smooth operation . . . one-piece, solid cast frame . . . close-grained smooth cast iron volute . . . are among the many big pump features you'll find in these moderate priced side suction centrifugals.

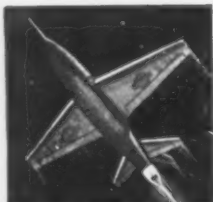
For a "cue" to better pump performance, choose the pumps that spell quality with a capital "Q" . . . Fairbanks-Morse Side Suction Centrifugals. Fairbanks, Morse & Co., 600 S. Michigan, Chicago 5, Ill.

**FAIRBANKS-MORSE**

a name worth remembering when you want the best

PUMPS • SCALES • ELECTRIC MOTORS  
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DUAL FUEL AND GASOLINE ENGINES

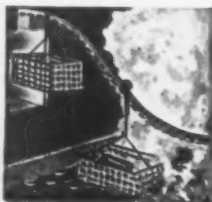
# How long will this valve last?



Hoskins Chromel-Alumel thermocouple alloys accurately register exhaust temperatures of jet aircraft engines.



Heating elements made of Hoskins Chromel give long life service in industrial electric furnaces, home appliances.



Hot stuff for hot jobs! Hoskins Alloy 502 is widely used by industry for many heat resistant mechanical applications.

You're looking in on a life-saving operation . . . one that's being performed on an engine valve. Not an ordinary valve for an ordinary engine. But a valve destined for long, hard service in an aircraft, tank, or heavy-duty truck engine. A valve that must be made to stand up under extremely severe operating conditions . . . high temperatures, for long periods of time, plus the destructive corrosive action of hot exhaust gases.

And what's responsible for long valve life under such gruelling conditions? Nothing less than Hoskins Alloy 717 . . . a closely controlled nickel-chromium composition developed especially for just such tough and vital service. It's highly resistant to heat . . . immune to the corrosive atmospheres created by combustion of high octane fuels. What's more, it's readily

applied by fusion to form a non-porous protective facing over the basic valve forging.

But 717 is only one of several specialized nickel-chromium alloys developed and produced by Hoskins. Among the others: Alloy 502 . . . known throughout industry for its dependability on a wide range of heat resistant mechanical applications. The Chromel-Alumel thermocouple alloys . . . unconditionally guaranteed to register true temperature—E.M.F. values within specified close limits. Spark plug electrode alloys which have become universally accepted standards of quality and durability. And, of course, there's Hoskins CHROMEL . . . the *original* nickel-chromium resistance alloy, used as heating elements and cold resistors in countless different products.

## HOSKINS

### MANUFACTURING COMPANY

4445 LAWTON AVENUE, DETROIT 8, MICHIGAN





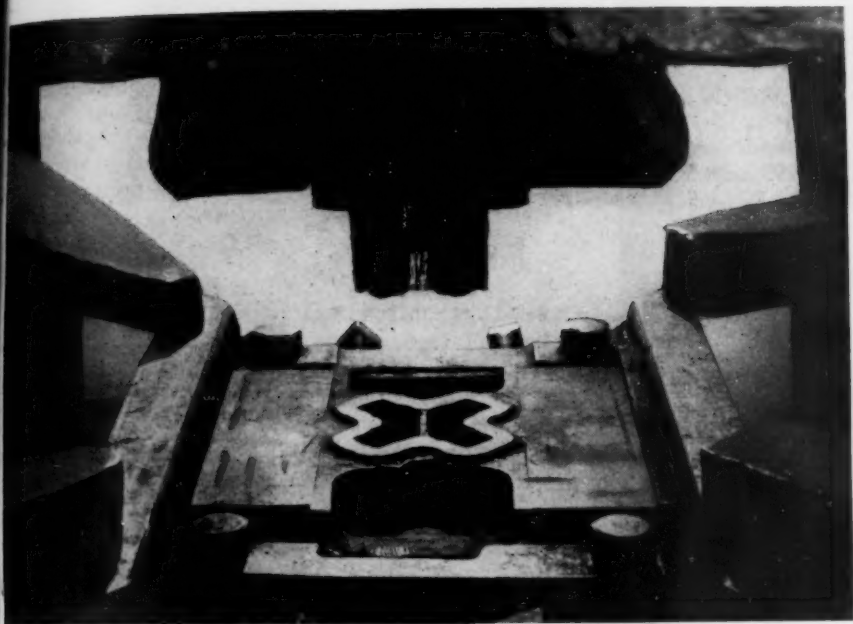


# Tool Steel Topics



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

The Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



In the center is the four-piece, composite trimmer die used in one of the service tests on Lehigh H tool steel. In the cold-trimming of 20,000 drop forgings, the two die components hardened by the high-temperature, "short-cut" method showed only one-half as much wear as the other two die components heat-treated in the usual way.

## "SHORT-CUT" Hardening Improves Wear of High-Carbon, High-Chrome Steels

Production men often lose patience, even tear out their hair, while waiting the many long hours necessary for the heat-treatment of tools and dies made from the high-carbon, high-chromium tool steels. When treating large dies, for example, it's not unusual to have a pack-hardening cycle of 24 hours or even longer. But until lately there's been no short-cut that doesn't result in improperly treated tools.

### Faster Treatment

That's why we're happy to report that our research men are developing a much faster method of heat-treatment — one that not only promises to save valuable time, but also imparts better wear-resistance than the usual heat-treatment for high-carbon, high-chromium steels.

It's a high-temperature treatment that does the trick. Ordinarily these grades are hardened by a long soak at 1850 F, followed by air-quenching. The new treatment involves a much shorter soak at about 2100 F. By no means perfected as yet, this new wrinkle was developed in

a series of experiments in which the dies hardened at 2100 F were used in actual production work along with similar dies hardened at 1850 F.

### Longer Wear

Dies used for cold-trimming drop forgings, for example, were hardened by both methods. These were composite dies, each made up of four assembled sections. Operating conditions were exactly the same. Careful measurements were made at regular intervals to determine the amount of wear between the cutting edges opposite each other. After trimming 20,000 forgings, the wear of the die edges was .012 in. on the pair of trimmer-die components treated by conventional methods; on the dies hardened by the high-temperature cycle the wear amounted to only .006 in. — just half as much.

### Data Now Available

Tests are continuing. If you'd like to have the details of our work to date, drop us a line at Bethlehem, Pa. Address your request to Room 1037A, Publications Department, Bethlehem Steel Co.

## BETHLEHEM TOOL STEEL ENGINEER SAYS:



*Here are five fundamentals of successful toolmaking.*

It's always a challenge for toolmakers to produce tools or dies which will be both hard enough to stand up in service and ductile enough not to crack, either in the making or in use. To get the necessary ductility, most tools are hardened below the maximum obtainable.

Once the proper balance between hardness and ductility has been determined in service, the maintenance of this balance helps to assure good performance. But good tool performance depends on more than that. In fact, there are these five fundamentals which must be considered:

1. Good tool design
2. Sound tool steel, of proper grade
3. Correct heat-treatment
4. Proper grinding
5. Proper application of the tool

These five fundamentals are like links in a chain; a deficiency in any one of these steps, or links, can lead to trouble. Poor tool design, for example, may often result in quenching cracks. Careful attention paid to each of these factors will help you to get the best tool life.



### RESTRICK DIE

This restrike die made of A-H5 tool steel is one of the precision tools used in making parts for torque converters. A-H5 has better wear-resistance than standard oil-hardening steel and holds more accurately to size during heat-treatment. It's a general-purpose, air-hardening grade containing 5 pct chromium, yet it's as economical as most oil-hardening tool steels.

★Starred items are digested at the right.

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## NEWS DEVELOPMENTS

**PITTSBURGH'S BEEHIVES SHOW LITTLE SMOKE—P. 49**  
One of the Pittsburgh district's most spectacular industrial "shows" has rung down the curtain. But no one is betting against a return performance. Almost all of the area's beehive coke ovens are out of production, the victims of lower steel demand and growth of chemical recovery coke oven capacity.

**SMALL BUSINESS CAN USE RADIOISOTOPES—P. 51**  
Use of atomic energy is often thought reserved for big business and government. But it isn't so. Nuclear power plants are pretty well out for the small firm but use of radioisotopes can be put to work. Costs are not prohibitive and these methods offer unusual advantages. AEC shipments total 1000 a month.

**WHO DOES RESEARCH, WHO PAYS FOR IT—P. 52**  
Private industry does by far the largest part of the nation's research and development work, but the government foots the biggest part of the bill. Of \$3.8 billion worth of research done in 1952, industry did \$2.5 billion worth. Amount done in industry increased 40 pct from 1949 to 1952.

**RANKS OF JOBLESS GROW IN MOTOR CITY — P. 56**  
Periodic employment problems aren't new in Detroit but readjustment plus the seasonal slump have compounded the setback. Now designated a labor-surplus area, Detroit has defense contract preference. But many aren't at all worried, expecting the spring sales spurt to boost automotive employment.

**WESTERN STEEL ENGINEERS OUTLINE PROGRESS—P. 57**  
Western steel engineers rallied their forces last week and were amazed at their own growth. Among papers given at Los Angeles meeting of Assn. of Iron and Steel Engineers were: Description of vertical mechanical extrusion presses; the case for electric furnaces; magnetic amplifier tension control.

**UNEMPLOYMENT SOFTENS UNION DEMANDS — P. 73**  
The loosening labor market has definitely toned down union attitude. This sets a pattern for months ahead of fewer strikes, smaller pay increases and longer negotiation periods. Labor will stress pensions, insurance benefits, other security measures. Some union men feel end of EPT will soften employers.

## MARKETS & PRICES

**NEW HOUSING HAS A CHANCE TO BEAT 1953—P. 50**  
Hinging on congressional approval of the Administration's new housing bill are chances of improved demand for such heavy consumer goods as furnaces, home air conditioners, refrigerators. If passed, the bill may assure topping the 1.1 million housing starts in '53. No one predicts passage without changes.

**DON'T EXPECT TO GET MORE NICKEL IN 1954 — P. 59**  
Stepped up stockpiling makes it clear that civilian users won't get any more nickel this year than last. First half civilian supplies will be less than 1953 but second half should see a pickup—depending on military stretchouts. But the stockpiling rate is not expected to be trimmed during 1954.

**FORD UNVEILS ITS ANSWER TO THE CORVETTE — P. 68**  
Last weekend Ford Motor Co. gave its answer to the Corvette, serving notice that Chevrolet's monopoly in this specialized field will end next fall—that's when the Thunderbird goes into production. More conventionally built than its rival, the Thunderbird's styling is as radically new as the Corvette.

**WILL IKE CHANGE HIS ECONOMIC POLICY? — P. 81**  
If employment doesn't pick up by late March, early April, the Administration's economic policy may change from one designed to stimulate business expansion to one calculated to increase consumer spending. First indication of this was Mr. Eisenhower's statement that he may ask for cut in personal income taxes.

**STEEL MARKETS HINGE ON PRICE AND SERVICE—P. 207**  
Price and service are the keys to selling in today's steel market. Some of the concessions being made today would have been unthinkable a few months ago. But that doesn't mean that the purchasing agent can relax and enjoy the buyers' market. Alert buying can pay off as handsomely as smart procurement did before.

**MAGNESIUM PLANT MAY GO UP FOR SALE — P. 210**  
A Washington official has told The Iron Age the Government would like to sell its Velasco, Tex., magnesium plant. Plant is an efficient producer under Dow Chemical operation—but any other firm might have difficulty. Painesville, Ohio, plant has been ordered into mothballs by Office Of Defense Mobilization.

## WHAT'S NEW IN INDUSTRIAL FURNACES

Modern furnaces save manpower, time and fuel. Many are automatic; a single piece of equipment does in one continuous operation what several separate units used to do. Some processing has been cut from days to hours. Scientific control substitutes for human judgment to reduce spoilage. New controlled atmospheres and salt baths cut metal losses, reduce descaling and machining time.

New equipment is safer, uses fuels more efficiently. It is designed to take its place in the production line, saving space, fuel and materials handling.

Progress in industrial heating has been much greater than most industrialists realize. Old furnaces are a lot like the one horse shay. They look as though they'd never wear out. But by 1954's competitive standards many are obsolete. How do yours stack up? This special feature is packed with scores of case studies showing how modern furnaces have helped others cut costs, save manpower, produce a better product.

**Special Furnace Section starts on p. 111**

### SURFACE TREATING AND HARDENING—F-4

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### GLOSSARY OF TERMS—F-50

Definition of terms commonly used in heat treating.

### FURNACE ATMOSPHERES—F-34

What they are and how they are made.

### TEMPERATURE TABLES—F-70

Ranges for industrial furnace operations.





Dished heads, a common problem in the tank field are being formed in a range of sizes with a simple low cost die and without change in set-up.

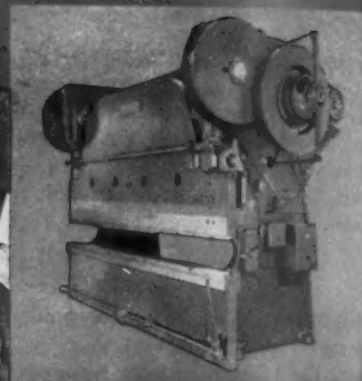
# Profitable versatility for jobbing work!

Cincinnati Press Brakes are profitable for bending, punching, press work and a great variety of jobbing applications.

Cincinnati Press Brakes, with low-cost tooling, simplify difficult sheet metal and plate jobs and are versatile, profitable and busy tools in any fabricating shop.

Write for Press Brake Catalog B-4.

*Photos courtesy Bishopric Products Co.*



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National  
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## Are You Guilty?

**M**ANY businessmen sincerely and honestly believe we are in for more than a mild recession or dip in industrial activity. They say so publicly. There are others who believe privately that things are going to pot. But publicly they decry the spreading of gloom.

You can believe whichever way you want to believe. But if you happen to be a big wheel whose utterances and ideas get into the press you do have an obligation. That obligation might be to think before you speak. Many people may be "on the fence." What you say may affect what they do in the future. And what they and thousands of other businessmen do may affect employment, purchasing power and actual buying.

Here are a few questions you might answer to your own social—or industrial—conscience before you think about good times or bad times; before you act or react optimistically or pessimistically:

¶ How is the financial condition of your company? If it is good are you cutting down the force? Have you added salesmen? Are you cutting costs crudely without regard to future growth? Are you replacing obsolete equipment and gaining advantages by bringing techniques up to date?

¶ Is your product being well received? Do you listen to what your customers have to say? And if you do listen what do you do about it? Have you plans for improving your product before your competitors force you to—or before they take a good chunk of your business?

¶ Are you carrying on research? If you have neglected research you may regret it. Do you know that research is a must whether it be for product, advertising, training, markets, production, sales, promotion or public relations. If you can't carry these projects yourself you can buy the services from institutes, firms, groups or associations.

This is still a free country. You have the right to succeed or fail, go backward or go forward, take a dim view or a broad view. But if enough business people think and act too pessimistically, if they all try to beat the rap or hedge when there is no real need to do so we will have more than a mild recession.

Based on your actions and answering only to yourself are you guilty of lack of faith in the industrial future of your country?

*Tom Campbell*

Editor



Baseboard Heater Manufacturer  
Safeguards Product  
By Specifying  
Rust-Resisting, Paint-Holding

**Galvanite\***



Punching louvers into baseboard face requires consistent steel hardness.



Galvanite\* takes welding as easily as plain steel. Here base-board ends are being spot welded.

Any baseboard, whether it be simple trim moulding or a modern heating unit, is subject to a lot of wear and punishment. That's why a leading eastern manufacturer of baseboard heating systems specifies Galvanite\* throughout. As they put it: "There is no substitute for quality, and we have found Galvanite\* best for our purposes."

Galvanite\* is Sharon's special process zinc-coated steel. It forms as well as hot rolled steel without flaking or peeling or excessively coating the dies. And, as this baseboard manufacturer discovered, Galvanite\* has a surface that really grips paint.

If you are manufacturing a product that must withstand rust and corrosion, or a product that is subjected to the weather, you won't find a better steel anywhere than Sharon Galvanite\*. Try it, compare results, and we feel sure you, too, will specify Galvanite\* from here on in.

\*Trade name copyrighted by the Sharon Steel Corporation



Type 430 Stainless and Galvanite\* Coated booklets are available from any Sharon office.

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*Sharon, Pennsylvania*



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*Wherever Rust is a Problem-Specify Galvanite\**



# Dear Editor:

## Letters from readers

### Tension Anonymous

Sir:

We'd like to do exactly what your editorial "Tension Anonymous" suggests—we'd like to pass your message along to the readers of our company publication, "Pipe Dreams." This magazine now goes to roughly 35,000 engineers, contractors, public officials, employees and friends of Universal. In using your editorial, we shall of course credit both you and THE IRON AGE.

M. PUCHIR  
Editor

Pipe Dreams  
Universal Concrete Pipe Co.  
Columbus, Ohio

### Diversification

Sir:

The Economic Division of the International Labor Office is completing a study of possibilities for ensuring more regular employment in the metal trades. A report based on this study will be presented to the I.L.O. Metal Trades Committee that will meet sometime this year.

In connection with this study I was interested to notice the article that appeared in your Jan. 7 issue, p. 256, on diversifying the product-mix when sales dip.

If your staff has any more readily accessible information on this subject that you could send to me, I would be very grateful. I would particularly like to have more examples of the diversified lines of products that are produced by individual firms in the metal trades.

E. J. RICHES  
Economic Adviser

International Labor Office  
Geneva, Switzerland

Our article entitled "Industry: Put Eggs in Many Baskets," appearing in the Apr. 30, 1953 issue, is another example of diversification.—Ed.

### Reader's Interest

Sir:

The first thing I read in THE IRON AGE is the editorial, next is the non-ferrous metal prices. Having bought New Jersey Zinc at 59 the editorials prove more enjoyable reading.

As for "Mr. Eisenhower Has Not Changed," we should not ask too much too soon. Politicians must not get too far ahead of public opinion. Editorials like yours pave the way for further progress by Mr. Eisenhower.

As for zinc imports, we cannot ask other nations to break down their trade barriers while we build up our

own. Zinc producers must try to meet competition by research for new uses for their products, by salesmanship and by efficient management.

P. A. SEWARD

Swampscott, Mass.

### Flex Tester

Sir:

We would like to have additional information on a Flex Tester which you mentioned in your article on stamping, p. 324 in your issue of Jan. 7. We do not have the Mar. 19, 1953 issue referred to in the article.

E. F. LORO  
Design Engineer

R-B-M Div.  
Essex Wire Corp.  
Lancaster, Ohio

For more details write to Steel City Testing Machines, Inc. 8851 Livernois Ave., Detroit 4, Mich.—Ed.

### Industrial Fluoroscope

Sir:

I am very much interested in the article in the Dec. 24 issue, p. 89, describing Radioactive Products' low cost industrial fluoroscope.

Can you refer my letter to this company so I can secure additional information?

J. J. LAUDIG  
Research Engineer

Delaware, Lackawanna &  
Western R. R. Co.  
Scranton, Pa.

Radioactive Products, Inc., 443 West Congress Ave., Detroit 26, Mich., will forward you additional information.—Ed.

### Shell Molding

Sir:

Thank you for granting us permission to reprint the article "Shell Molding Brings New Foundry Era." We plan to produce 5000 copies.

You may be assured that THE IRON AGE will receive proper credit in this reprint.

W. LANXNER  
Technical Writer

Bakelite Co.  
New York

### Opportunity Available

Sir:

Would you please send me the address of the General Motors Institute from whom we can get a booklet, "Appointment to Opportunity," mentioned in your Industrial Briefs section in the Feb. 4 issue.

Y. LECOQ

Hull, P. Q.

Address your request to the Registrar, General Motors Institute, Flint, Mich.—Ed.

"I Say  
Sheet Coil"



"THIS IS  
COLD ROLLED  
SHEET  
COIL"

Produced by High Speed  
Rolling on Continuous  
Wide Multiple Stand  
Mills and Still in  
Use



"I Say  
Thinsteel"



## Which kind of Cold Rolled Strip Steel is best for You?

### CONSIDER SHEET COIL

- if variations in physical characteristics are permissible.
- if fairly heavy oversize gauge variations are not objectionable.
- if the fabricating operations are not too complicated and do not require intricate expensive dies.
- if a fine surface finish is not essential.
- if a good base for paint or enamel is desired.
- if you do not object to some "square footage" loss due to oversize variation.
- then Sheet Coil will probably be the most economical material for the job.

### CONSIDER THINSTEEL

- if you must have a high degree of uniformity of chemistry and physical properties—and precision gauge tolerances.
- if you wish to keep die wear low, no oversize gauge variations.
- if you require a fine finish or a better base for plating.
- if you want maximum yield for "most finished parts per ton."
- if you want selected tempers for maximum strength and lightest weight.
- then you'll find Thinsteel the most economical material by far.

No Argument  
Here....



Kenilworth  
Stacks Both

You can always count on Kenilworth helping you get the right steel for your requirements. Order Sheet Coil or Thinsteel and notice that each coil carries an identifying tag as pictured above. Call on Kenilworth, too, for your needs in Stainless Sheets or flat rolled Spring Steels (Annealed or hardened and tempered).

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## 11 TIMES THE SERVICE

Steel mill was using rag roll as pinch roll on a shear unit. It lasted about three months on the job. Oil, heat, cutting and pressure contributing toward short life.

The G.T.M.—Goodyear Technical Man—recommended using a rubber-covered roll, specified compound and thickness to be used in covering the roll. This roll has served 33 months to date—*11 times the service at a slightly lower original cost.*

Why not discuss your roll covering problems—or procurement of complete rolls—with the G.T.M., or write Goodyear, Industrial Products Div., Akron 16, Ohio.

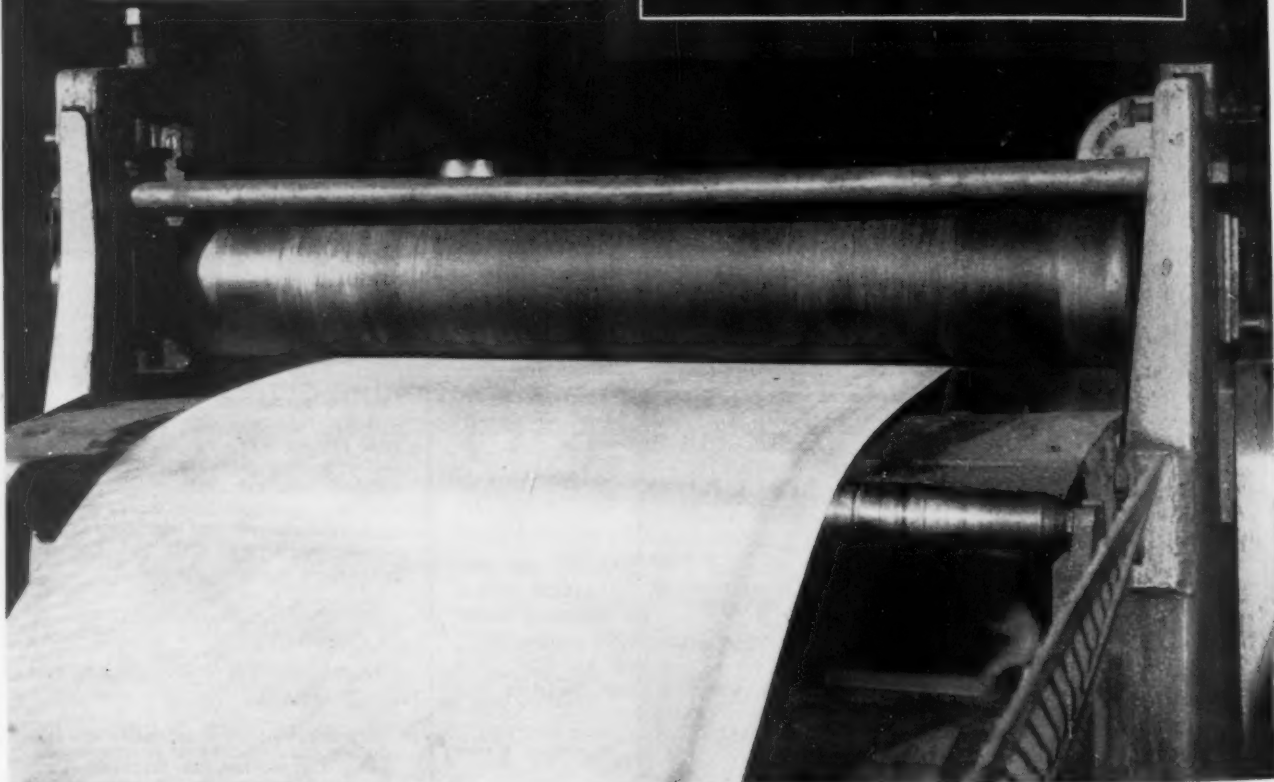
### GOODYEAR INDUSTRIAL PRODUCTS



#### -Specified TYPICAL ROLL

#### APPLICATIONS FOR STEEL MILLS

PROCESSES	TYPES OF ROLLS	
Electrolytic Tin Line	Scrubber	Slitter
Carbon Steel Pickling	Wringer	Tension
Continuous Galvanizing Line	Pinch	Directional
Continuous Annealing Line	Hold-down	Carrying
		Coating



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# GOOD YEAR

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# Fatigue Cracks

by William M. Coffey

## Inside The Iron Age

John McDowell, our Los Angeles news correspondent, has been informed by the makers of Pall Mall cigarettes that his big story is going to be presented by their *Big Story* program on radio and television. It's a mighty interesting story and it will find us tuned into the radio (think there's one in the attic) the last week in March, and watching TV sometime six months later.

The story goes back to John's war days as a GI war correspondent for the China-Burma-India Roundup. While in the 98-day siege of Myitkyina, John was wounded by shrapnel and was taken to the hospital of the famous Dr. Gordon Seagrave in Nam Kham, Burma, who was later to gain worldwide fame after his acquittal on charges of treason by the South Burmese government. While in the hospital John met two Burmese nurses who were heroes (heroines?) in their own right, having served in a forward hospital and retreated with U. S. forces, for which they received the Bronze Star.

In 1949 John was on the city desk of the Newark *Star-Ledger* when he received a short AP dispatch from Jersey City that two Burmese nurses at the Jersey City Medical Center were to be deported because their visas were due to expire in 4 days and the government would not renew them.

John thought the names were the same and immediately hopped over to Jersey City to see them. Sure enough, they were the same two and they were completely baffled by the whole deal. Seems Dr. Seagrave had sent them to the U. S. after the war for additional training and subsequently warned them to stay here as long as possible because the South Burmese were attempting to subjugate the northern sector and to return would probably mean death as it had to others in the area.

John got hot on the wire to many old CBI comrades and the response was terrific, since the nurses were known to all GI's in the area. Frank Merrill, New Hampshire state highway commissioner, who was wartime head of Merrill's Marauders, the outfit that reopened the Burma Road, started the ball rolling. Also General Pick of the Army Engineers who built the Ledo Road connecting it to the Burma Road, Congressman Peter Rodino of the New Jersey 10th

District introduced a bill for a 6-months' extension, and a bill in the Senate did likewise. Letters started pouring in from as far as Texas.

It finally culminated in a joint Senate-House hearing at which the two nurses appeared in native attire and faced the solons. Bills were passed and finally amid great pomp, President Truman signed the paper which made them permanent U. S. residents without citizenship until it was safe to return to their native land.

That's the story "as John lived and wrote it," as the Pall Mall announcer will say. And that's the stuff of which IRON AGE men are made, as we would say.

Incidentally, John's IRON AGE predecessor in Los Angeles, Jack Adams, also received the same award a few years ago.

## Puzzlers

In our effort to catch up, here again are the answers and winners to two more puzzlers.

Only Mr. Rice got the pool table puzzler correct. *Answer:* Impossible to do what was required because the ball would go into a side pocket. But Mr. Rice says if it was a billiard table the angle would be  $63^{\circ} 26'$ .

The answer to the new ladder puzzler (January 28th issue) is 46.87 feet. *Winners:* Ray Robinson, Howard Schwartz, our poetic friend Mr. Alsterland, Carl A. Johnson and Mark Perucich.

## New Puzzler

Years and years ago in Arabia, there was a meeting of horse fanciers to pursue the sport of kings. There were several races every day for a week, but at last the meet was over and everyone was gone except the owners of two horses, each of which had brought up the rear in every heat it raced.

Each owner was denouncing to the other the slowness of his own horse and one even went so far as to declare that his was "the slowest nag in all the world." The other disgruntled owner immediately challenged the statement because his "sack of bones and horseflesh" had not been entered in any of the races which the other had lost. The issue became heated and a bet was made and stakes fixed at 10,000 pieces of gold, 1,000 sheep and two tents with hot and cold running slave girls.

As they approached the starting point, one raised the question of how each would know the other was getting all the speed possible from his horse, since the slowest horse was to make his master the winner.

Could they, alone, run a fair race and, if so, how?

Mr. John Cluck has once again most generously rescued us.

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## How to bite through red-hot steel

### *A typical example of B. F. Goodrich improvement in rubber*

**T**HAT'S a big circular saw biting red-hot steel used to make blades for Jet airplanes. A belt was used to keep the saw spinning. But the sudden jerk of pushing whirling saw into heavy steel made the belt slip, and stopped the saw. Then when the belt took hold again, the sudden crashing bite often shattered the \$60 saw.

With saws lasting only two or three days, the steel company looked for a belt that wouldn't slip, wouldn't let the saw slow down or stop. A B. F. Goodrich man told them about the high-capacity Grommet belt—a 40% stronger V belt, developed and made only by B. F. Goodrich. A grommet is

a cord loop inside the belt. It is made like a giant twisted cable except that it's endless—no splices or overlaps. The grommets make it a flexible belt, and one that doesn't slip or stretch as much as ordinary belts. No other kind of belt has grommets; no other belt stands so much punishment or lasts so long.

The B. F. Goodrich belts were installed. Since they stretch less than other V belts, the constant high speed needed for smooth cutting is maintained with no slips, no stops. And in the first three months, the company saved \$1,620 in saw costs alone.

The Grommet belt is typical of

B. F. Goodrich research which is constantly at work improving all kinds of belting, hose and other rubber products and finding new ways to use them better. Don't decide any rubber product you may buy is the best to be had without first finding out from your BFG distributor what B. F. Goodrich research may have done recently to improve it. Or write *The B. F. Goodrich Company, Dept. M-173, Akron 18, Ohio.*

Grommet—T. M. The B. F. Goodrich Co.

**B.F. Goodrich**  
**INDUSTRIAL PRODUCTS**  
**DIVISION**

# THE IRON AGE Newsfront

**WIDER USE OF BERYLLIUM IN INDUSTRY** may stem from declassification of material and processing methods. Good high temperature properties, conductivity, light weight make it a natural for instruments. Broader use could bring cost down.

**PRACTICAL ULTRASONIC SOLDERING AND BRAZING** methods are being developed. One unit now being tested (for aluminum and other materials) uses a 1000-w generator set to drive a 50-lb solder pot. Ability to obtain clean joints without flux could be especially useful where elimination of corrosion is important.

**ATTRACTIVENESS OF PLASTIC MATERIALS** for automobile bodies is understandable when these facts are known: Plastic bodies are almost three times as thick, little more than half the weight of comparable steel structure. Material is rust-proof, reasonably weather-proof, free from drumming noises.

**OPTICAL CEMENT DEVELOPED BY NAVY** shows adaptability for many uses with instruments containing glass and subjected to wide ranges of temperature. The plasticized cellulose caprate adheres well, is neutral to glass, has excellent moisture resistance.

**LOOK FOR CUTS IN AUTO EXTRA PRICES**, other charges, boosts in trade-in values before cuts in list prices. Competitive auto market may demand price concessions, but industry will probably cut all other prices before attacking base prices.

**WALTER REUTHER IS IN FIRM CONTROL** of CIO, but old jealousies smolder. There's sentiment in United Steelworker ranks to let Reuther carry the ball on GAW--letting Autoworkers be labor's shock troops, as Steelworkers often were when Philip Murray led CIO.

**OXYGEN STEELMAKING IS GAINING** ground in this country. One steel mill has already decided to use the Austrian-developed oxygen steel refining method. Austrian steelmakers are scheduled to visit a second company here soon to discuss another application.

**SHORTER OPENHEARTH TAPPING CYCLES** through use of oxygen enriched air to melt scrap may be in steelmaking's future. Despite spate of new steelmaking methods, openhearth will continue as bulwark in steel production.

**CAST TO SHAPE DIES FOR SMALL PARTS** are getting more attention. Dies poured to shape from cast iron, ductile iron or steel, within required tolerances and without need for subsequent machining, may have a better surface for stamping operations.

**GOVERNMENT WANTS OUT** on its big magnesium plant at Velasco, Texas, only government-owned plant producing. Contract to operate, now held by Dow Chemical Co., expires June 30. Big question: Who will buy? Plant is efficient, but any buyer other than Dow might not find it competitive.

**NICKEL-PLATED SHEET AND PLATE** may replace corrosion resistant clad materials in some applications. Process is now used for plating steel of fire-box quality in thicknesses to  $\frac{1}{4}$  in. Coating stands up well in forming, it is reported.

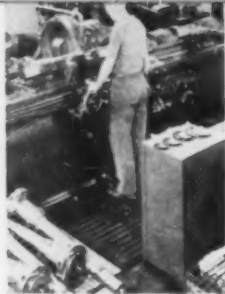
February 25, 1954

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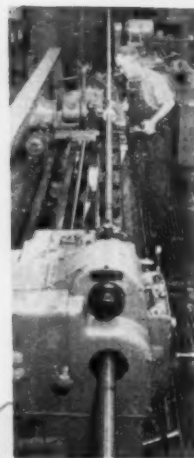
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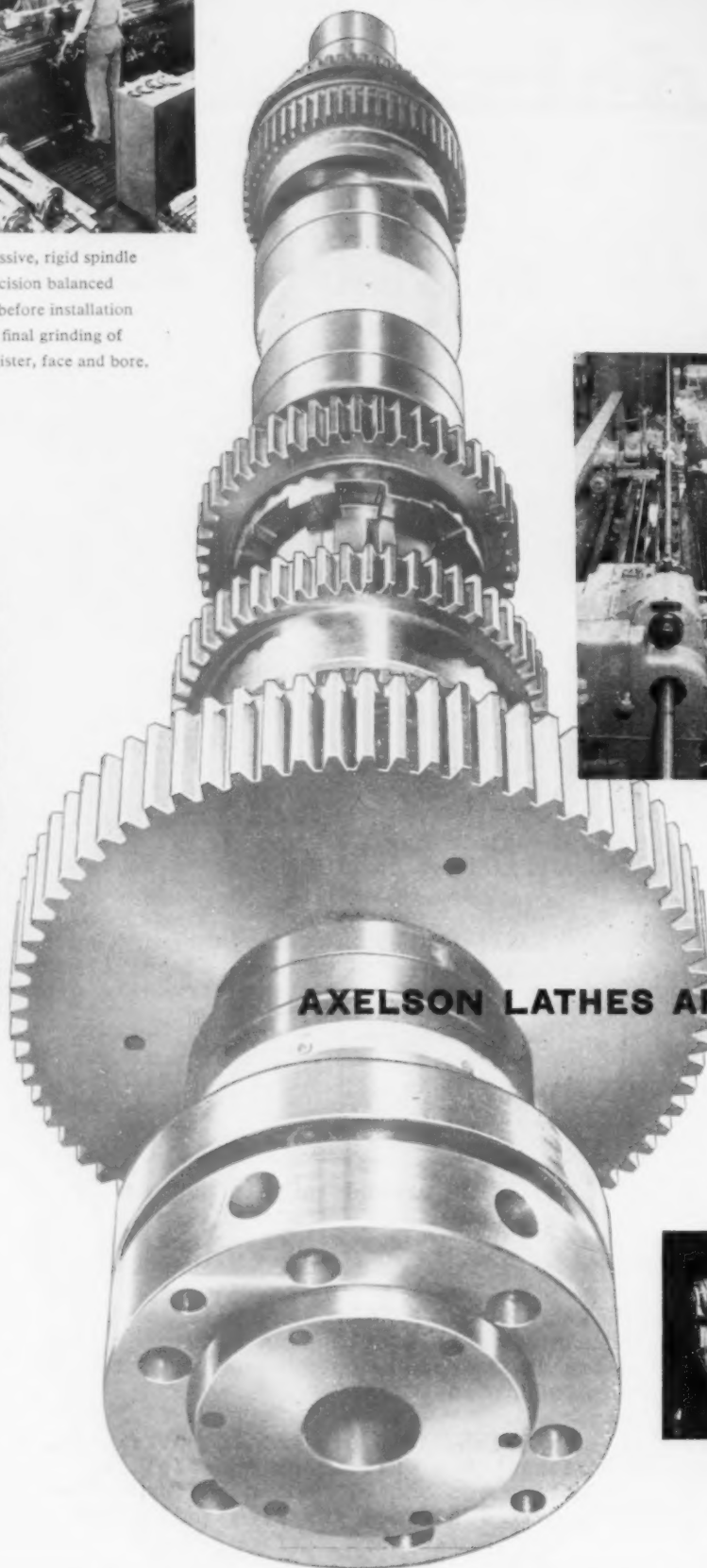
Massive, rigid spindle is precision balanced before installation and final grinding of register, face and bore.



Planing of the bedway and final precision grinding of tool steel vee and flat ways are vital operations in the final accuracy of the finished lathe.

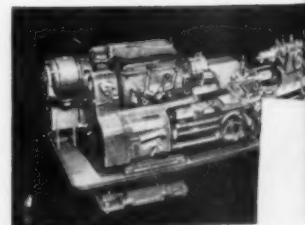


Thread milling stress relieved alloy steel lead screw in a temperature-humidity controlled room.



## AXELSON LATHES ARE ACCURATE

20" Model D heavy duty, 24 speed precision engine lathe



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## Smoke Fades from Beehive Coke Plants

Almost all beehive coke ovens in the Pittsburgh area are out of production . . . Chemical recovery ovens have taken over . . . But beehives could come back—By J. B. Delaney.

One of the Pittsburgh district's most spectacular industrial "shows" has rung down the curtain.

But no one is betting against a return performance.

Virtually all the beehive coke ovens in the area have been taken out of production, victims of reduced demand for steel and expansion of chemical recovery coke oven capacity.

Barring an unlooked-for major upturn in the steel market, the beehives probably will lay idle for a long time. This would be nothing new for the industry, and that's the reason veteran operators hesitate to say the beehives are finished. They can point to many occasions when these ovens filled the breach between demand and chemical recovery capacity.

### Few Are Operating

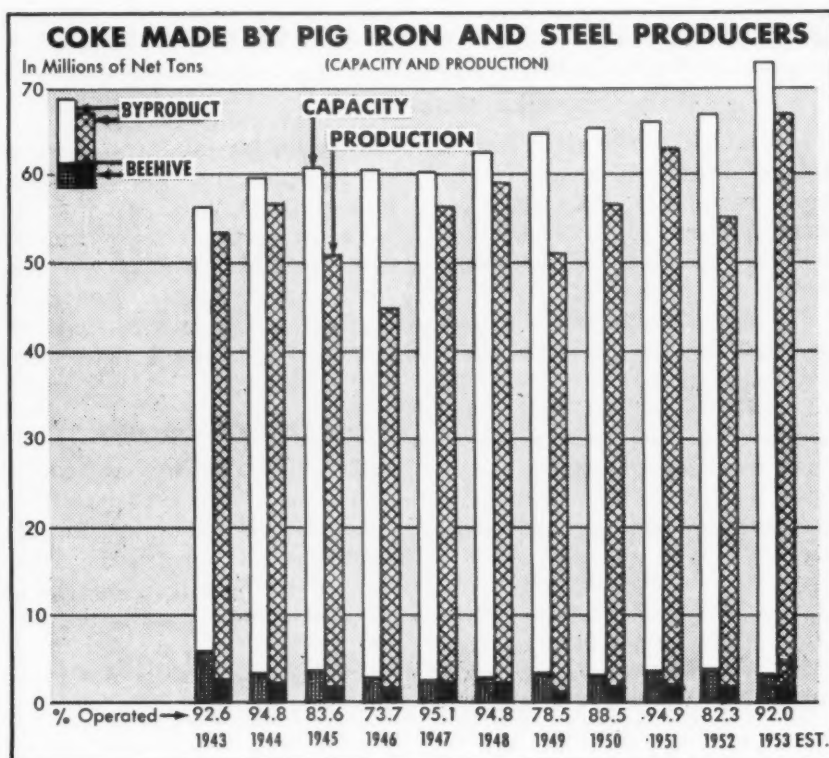
When they are operating, the beehives create an impressive, though smoky, industrial picture after dark. Their smouldering fires produce a flickering pattern of light over the nighttime landscape in the coal fields of Fayette and

Westmoreland counties of Western Pennsylvania.

Of the approximately 11,000 beehives in the Connellsville-Uniontown, Latrobe-Greensburg area,

only a scattered few are operating. These are producing high-sulphur coke which is being stockpiled. U. S. Steel Corp. several weeks ago took out of production the last of its 2800 ovens in the area.

With chemical recovery oven capacity steadily increasing in step with increased steel capacity, the beehives, inefficient and wasteful



## HOUSING: Has a Chance to Beat '53

**Passage of Administration's housing bill would likely boost new starts . . . This would brighten outlook for appliances, heating and air conditioning—By R. M. Stroupe.**

Hinging on congressional approval of the Administration's new housing bill are chances of improved demand for such heavy consumer goods as furnaces, home air conditioners, and refrigerators.

These chances look bright as the House Banking Committee prepares to take up the bill (H. R. 7839) next week. Senate committee action on an identical measure (S. 2938) will be delayed for some time.

### Deals With Financing, Too

No one in official Washington is rash enough to forecast passage of the housing bill without changes, but its substance seems likely to go undisturbed. If the basic framework becomes law, two important results this year are foreshadowed:

(1) The law may be the instrument for guaranteeing considerably more housing starts this year than the 1.1 million recorded in 1953.

(2) As new homes go up and repair and modernization activity in-

creases, there should be a thriving market for the equipment needed to make homes livable.

Called for in the Administration bill is a maximum of \$5 million in grants to communities for developing, testing, and reporting on new and improved methods of preventing and eliminating blighted conditions.

Only a part of this legislation, however, deals with new housing and slum clearance. Other portions of the measure are intended to:

(1) Equalize Federal Housing Administration mortgage insurance terms between new and old houses.

(2) Give home owners access to easier financing terms so as to permit better maintenance of existing houses.

(3) Replace Federal National Mortgage Assn. with a new agency, initially using government funds, to provide a "true" secondary mortgage market.

(4) Authorize funds for assisting the city planning of small cities—those with fewer than 25,000 residents.

(5) Modernize provisions of several existing housing laws.

(6) Open a new source of housing supply for low-income families.

Included in this portion of the bill is an "experimental" plan to aid low-income groups in buying homes costing not more than \$8000 with a down payment of as little as \$200. The government would permit a 40-yr guaranteed mortgage.

### Public Housing to Fade

Families eligible under these special provisions would be limited to those dispossessed in the course of slum clearance and renovation programs. If private builders are encouraged to put up low-cost homes which these families can buy, Housing Administrator Albert M. Cole reasons, there will be less pressure for public housing.

For a few years, he says, the government will have to continue public housing as a "responsibility," while blighted sections are being cleared. He makes clear, however, that the Eisenhower Administration wants to remove the government from home-building.

## Special Report

Continued

of valuable by-products, cannot hope to compete. They are pressed into service only when coke demand exceeds supply. Such occasions are likely to be extremely rare in the future.

Further handicapping the beehive industry is the decreasing availability of good coking coal in the Pittsburgh district. If Western Pennsylvania steel producers have to reach out for low sulphur coals, the added freight costs will make less likely use of this coal in beehives.

### Dipped From '51

In a preliminary report, the Bureau of Mines sets 1953 coke production at 78.5 million net tons, compared with 62.1 million tons in 1952. Of the 1953 total, 5.2 million

tons were produced in beehive ovens, compared with 4.4 million tons in 1952.

The proportion of coke supplied by the beehive ovens last year was 7 pct, about the same relationship to the total as in 1952, but less than in 1951 when it represented 9 pct of the total.

### Ovens Are Overage

The Bureau reports that chemical recovery oven capacity rose a net of about 4 million tons in 1953, one of the best construction years since World War I. At the end of the year, annual capacity approximated 80 million tons.

Bureau statisticians estimate chemical recovery oven capacity will rise to 82 or 83 million tons in 1954 if all scheduled new con-

struction and rebuilding projects are carried through.

Despite the building and modernization spree of the last several years, a large percentage of coke production comes from overage ovens—ovens older than 25 years. Bureau of Mines estimates overage units account for 45 pct of the total, or 37 pct of the industry's capacity.

While coke capacity is now more than ample, there was a time in 1952 when the Government feared beehive and chemical recovery capacity combined would not be enough to meet demand. At that time, several million dollars were invested in construction of 284 beehive ovens at Indiana, Pa. The ovens operated for a time but are now idle.

# ATOMS: You Can Use Radioisotopes

**Small firms, using radioisotopes, can put atomic energy to work . . . Costs aren't prohibitive . . . Methods offer unusual advantages . . . AEC shipments total 1000 a month.**

Use of atomic energy is often thought to be pretty well reserved for big business and government. But it isn't so.

While development of nuclear power is out for small and medium-sized firms, they can use radioactivity in a number of ways—and not too expensively.

Atomic Energy Commission points out several of these facts in a pamphlet titled *Radioisotopes and Small Business*. No. 31 in the Technical Aid series, it was recently issued by Small Business Administration and is available from the agency's field offices.

## Industry Is Biggest User

High on the list of uses for metalworking firms are continuous gaging, nondestructive testing and measurement of wear. Other than penetration, radioisotope properties which may be put to service by small industry are the ability to induce chemical reactions, the ability to cause fluorescence and ionization and the ability to cause desirable biological changes.

There's no question that private industry is adopting radioisotope techniques. By the end of 1953 AEC had authorized 1858 organizations to use reactor-produced radioisotopes. Of this number 774 were industrial firms. Second largest was the field of medicine with around 627.

## AEC Cuts Prices

About 50,000 shipments of radioisotopes have been made from producing facilities at Oak Ridge National Laboratory and they now average about 1000 per month. But you don't always have to purchase an isotope outright—Brookhaven National Laboratory, for instance, will irradiate piston rings up to 16 in. in diam and related engine parts. By measuring the

radioactivity of lubricants from an engine with a radioactive part it is possible to measure the wear on that part without dismantling the engine or even stopping it.

For article on proposed Atomic Energy Act amendments to allow freer industry use of atomic energy see p. 75—Ed.

AEC trimmed prices during the latter part of 1953 on quantity purchases of the most commonly used radioisotopes. These are radiocarbon, radiophosphorus, radioiodine and radiothallium. Some 100 different radioactive materials are distributed with prices varying according to type, purity and amount of radioactivity.

Cobalt 60, widely used for radiographic testing and inspection, costs about \$50 for an 800-millicurie source. Another \$35 or more is charged for enclosing it in a shielding capsule. Handling and shipping costs add up to another \$10 it is estimated.

## What Are Advantages?

Cost of the radioactive material for a thickness gage may be as little as \$25 but, AEC hastens to point out, the entire cost to pro-

duce the instrument and associated electronic equipment may run from \$4000 to \$8000.

What are some of the advantages metalworking firms can obtain from these new techniques?

In the measurement of engine wear already mentioned, metal loss can be checked to 0.00001 oz. A test run of only 15 to 30 minutes will yield a measurement. Without using a radioisotope the parts would have to be weighed or calipered using laboratory methods which are slow at best. The engine, of course, would have to be dismantled and a long run would be necessary to give a measurable amount of wear.

Cutting tool wear may be measured in a similar way. Methods have been devised for checking wear of firebrick furnace linings without tearing out a section of brick. The system operates continuously, gives warning of incipient failure.

## Gages Very Accurate

This is done by placing pellets of cobalt 60 between the ordinary brick and the firebrick lining. Transmission of radiation is least when the lining is new and increases as material is worn away. As soon as a pellet is exposed it dissolves, making the melt slightly radioactive. By checking gamma radiation outside the furnace, it is possible to determine where the lining failed.

Backscatter-type gages provide a continuous means of accurately checking the thickness of dissimilar coatings on moving strip. Samples would be tin or zinc on steel or even lacquer on tinplate. Sensitivity varies with different materials but for tin and iron it is about 0.001 oz per sq ft.

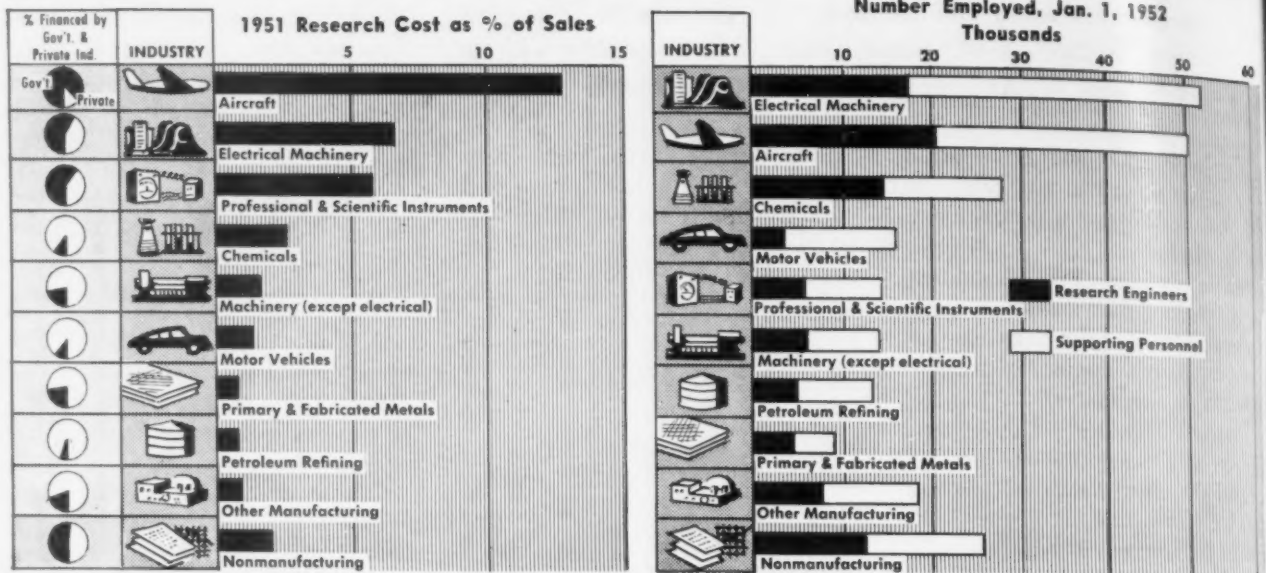
Transmission-type gages will measure variations in strip thickness as small as 0.5 to 2 pct of the thickness. Gages of this type are manufactured by several firms and more than 100 are in use by industry. An advantage of both gage types is that gaging does not require contact with the moving strip.



"I assure you, Professor, Max has been highly recommended."



# Growth Paced by Industry and Government



**Research inventory shows industry performs most research and government puts up most money . . . Defense industries spend most, but get most help from government.**

Private industry does by far the largest part of the nation's research and development work, but government foots the biggest part of the bill.

A 1952 survey by the Research and Development Board places total expenditures for scientific and engineering research and development at \$3.8 billion. More than \$2.5 billion of this work was performed in facilities owned and operated by private industry.

## Needed Industry Facts

Both the total national outlay and the amount of the research performed by private business were more than 40 pct higher in 1952 than in 1949. This is attributed largely to emphasis on military technology during the mobilization period. But simultaneous expansion of the civilian economy also shared in the increase.

The RDB survey was conducted to fill the need for more information on industry's huge research resources comparable to data already available on government and college facilities. Nearly 2000 companies, including almost all com-

panies with large research programs, sent in usable questionnaires.

These firms accounted for an estimated 85 pct of all industrial research conducted in the U. S. Together they employed 6.5 million persons and sold nearly \$100 billion of goods and services during 1951.

## Large Firms Do Most

About 96,000 research engineers and scientists were employed in 1952 by the nearly 2000 companies in the study. Close to three-fourths were working for companies in six branches of manufacturing — aircraft, electrical machinery, chemicals and allied products, professional and scientific instruments, machinery (except electrical), and petroleum refining. Over half were employed in the first three of these groups.

Large companies employed most of the engineers and scientists. Two out of three were on the staffs of companies with 5000 or more employees.

Only 1.5 pct of employees of reporting companies were research

engineers or scientists. This percentage is higher, of course, than would have been found if companies without research programs had been included in the survey.

About half the industry research engineers and scientists were working on federally financed projects, almost all of which were sponsored by Dept. of Defense or Atomic Energy Commission. Number working on government financed contracts increased by more than 50 pct between Jan. 1, '51 and Jan. 1, '52. Yet most industries increased employment on company financed projects during that year.

The total number of supporting workers (including technical and laboratory assistants and clerical and administrative personnel) employed by companies in the survey was 143,000. Average ratio was 1.5 supporting workers per research engineer or scientist. However, this ratio varied widely among companies of different sizes, among industries, and from one company to another in the same industry and size group.

## Government Pays Half

Total cost of research performed by the reporting companies was nearly \$2 billion during 1951.

Electrical machinery, aircraft, and chemicals industries, which were leading employers of research personnel, also performed the greatest dollar volume of research work—altogether, more than \$1 billion.

The government paid for nearly half the cost of the research and development performed by industry in 1951. Among major industries, the government's share of research cost ranged from 85 pct in aircraft manufacturing to a low of 3 pct in petroleum refining.

In companies with fewer than 500 employees about three-fifths of research was government financed. In larger companies the government paid for about half the research. However, larger companies did far more research for the government because their total research capacity was much greater.

#### Costs 2 Pct of Sales

Research cost amounted to about 2 pct of sales of the reporting companies during 1951. The proportion was highest in the aircraft industry where it reached 13 pct. In several others it was less than 1 pct. This proportion also varied greatly among companies in the same industry.

Average cost per research engineer or scientist in 1951 was \$21,900. Of the branches of manufacturing with large programs, the one with the lowest cost per engineer scientist was chemicals and allied products. At the other extreme was the motor vehicle industry, with an average cost about

four times as high. Figures for individual companies also varied greatly.

When supporting personnel were included, average cost per research worker was \$8,800. This cost varied much less among industries and companies than average cost per research engineer or scientist.

Concentration of professional research people in large companies is apparent when companies are classified according to total employment. In 1952 approximately 40 pct of these professionals worked for the 44 largest companies, each of which had at least 25,000 employees. These companies comprised only 2 pct of the 1953 companies in the study. Two-thirds of the research engineers and scientists were employed by the 222 companies (11 pct of the total) with 5000 or more employees. In contrast, only 4 pct worked for 642 companies (33 pct of the total) with fewer than 100 employees.

Average of research engineers and scientists in all reporting companies together was found to be 1.5 pct of employment in January 1952. The aircraft industry, which employed the most researchers, also led in researchers compared to total workers—4.3 pct. Next in order came professional and scientific instruments with 3.7 pct researchers; chemicals, 3.0 pct; and electrical machinery, 2.7 pct.

Industries with the lowest ratios

were primary metals, 0.3 pct; motor vehicles, 0.4 pct; and nonmanufacturing industries other than consulting and nonprofit agencies, 0.4 pct. Commercial consulting and nonprofit research agencies naturally had much higher ratios, 24.5 pct and 47.2 pct respectively.

In most manufacturing industries smaller companies had a larger portion of total employees in research than did larger firms.

#### Large Firms Spend More

Research costs were generally higher in the same industries that led in numbers of research workers. Topping the list on total research costs were electrical machinery, aircraft, and chemicals. They accounted for 54 pct of total 1951 cost of research and development reported by companies in the survey. This is the same as their share of employment of professional researchers.

Concentration of research and development activity in the largest companies was greater when measured in terms of cost than in terms of employment. The seven companies in the survey which employed 100,000 or more workers were responsible for 26 pct of the 1951 cost, compared with 14 pct of research engineers and scientists employed in January 1952.

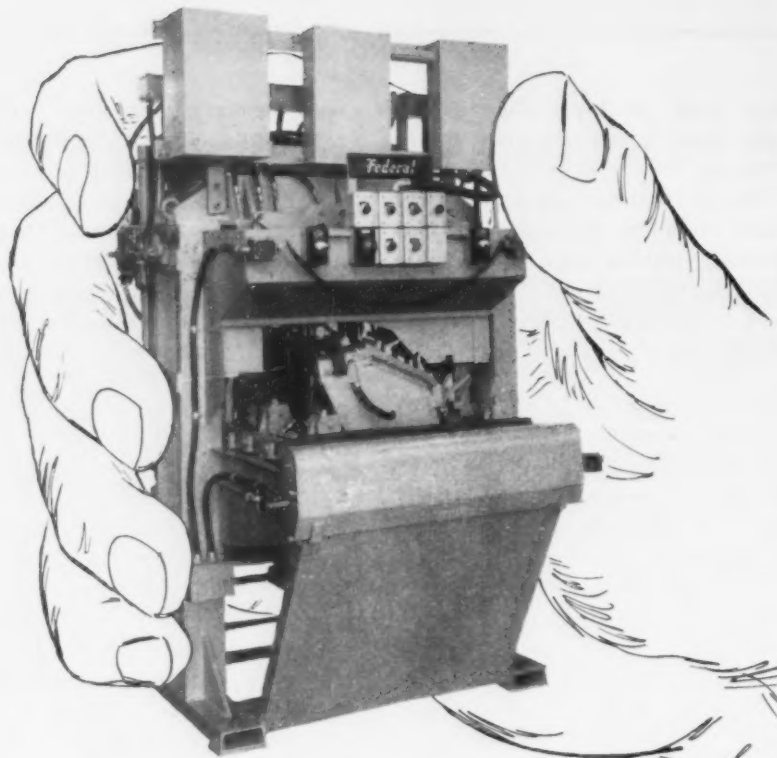
Although research performed in colleges is overshadowed by that done by industry and government, it has increased significantly (see table below).

## RESEARCH: Who Does the Work and Who Foots the Bill

(Expenditures in the U. S. in millions of dollars)

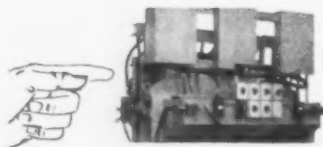
Year	Total Research Expenditures	GOVERNMENT				INDUSTRY				COLLEGES & UNIVERSITIES			
		Spent		Performed		Spent		Performed		Spent		Performed	
		Amount	Pct	Amount	Pct	Amount	Pct	Amount	Pct	Amount	Pct	Amount	Pct
1941	\$ 900	\$ 370	41	\$200	22	\$ 510	57	\$ 660	73	\$20	2	\$ 40	5
1942	1,070	490	46	240	22	560	52	780	73	20	2	50	5
1943	1,210	780	64	300	25	410	34	850	70	20	2	60	5
1944	1,380	940	68	390	28	420	30	910	66	20	2	80	6
1945	1,520	1,070	70	430	28	430	28	990	65	20	2	100	7
1946	1,780	910	51	470	26	840	47	1,190	67	30	2	120	7
1947	2,260	1,160	51	520	23	1,050	47	1,570	69	50	2	170	8
1948	2,610	1,390	53	570	22	1,150	44	1,820	70	70	3	220	8
1949	2,610	1,550	59	550	21	990	38	1,790	69	70	3	270	10
1950	2,870	1,610	56	570	20	1,190	41	1,980	69	80	3	320	11
1951	3,360	1,980	59	700	21	1,300	39	2,300	68	80	2	360	11
1952	3,750	2,249	60	800	21	1,430	38	2,530	68	80	2	420	11

Source: Research and Development Board, Department of Defense.



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THE FEDERAL MACHINE & WELDER COMPANY

WARREN, OHIO



## Purchasing

### Steel:

**Purchasing agents roundup...  
Market soft, no shortages.**

Steel buyers are in a good position, much better than they thought possible 6 months ago. Supply is plentiful and price reductions in the form of freight absorption are spreading. That's the overall analysis of the steel market made by National Assn. of Purchasing Agents last week.

Except for wide-flange beams, there are no steel items that are tight, and NAPA expects the market to remain soft through the first quarter.

#### Strike Won't Hurt So Much

No shortages are anticipated by purchasing agents unless there is a strike of several months duration. However, NAPA believes steel producers would be able to recover much faster than in 1952 because there is no big arms program cutting into supplies.

NAPA analysis of the steel market in various areas:

**East:** Competition among suppliers is getting keener. Prices are being adjusted but no special deals are reported from accredited sources. While their orders are smaller and less frequent, warehouses still seem to be doing a fair volume of business.

**Midwest:** Chicago producers are operating at near 100 pct capacity, far above the national January average of 74.4 pct. But even at this high operating rate mills are able to make deliveries. Some sources report quality is not up to specifications.

Generally in the Midwest all types of steel are in easy supply. Any item can be obtained from a mill within 30 days with the exception of wide-flange beams and cold-finished mechanical tubing.

**Southwest:** Many carbon steel and alloy items can be ordered on a month-to-month basis. Marginal producers have reduced prices to remain competitive.



**West Coast:** Market parallels that in other parts of the country—supply exceeds demand. Mills are producing items for stock for the first time in several years which means orders will be filled on short notice.

**Canada:** Steel demand will be sufficient to keep producers operating at a good pace for the next few months. Mill orders require a maximum lead time of 90 days but most items are on much shorter schedules.

## Farm Equipment:

### Harvester pushing new tractor with torque amplifier.

Market for farm equipment has been increasingly competitive during the past 2 years. International Harvester President John McCaffrey suggested one antidote early this year, when he indicated that farm equipment men, like auto manufacturers, must bring out more new models more often, introduce an element he called "controlled obsolescence."

Mr. McCaffrey it developed, was speaking from behind a pat hand. Last week in Chicago, International Harvester announced it was coming out with a tractor featuring a torque amplifier.

The new MTA model, a medium tractor modified with a new power takeoff, a torque amplifier and many minor changes, is already being produced.

### Pull Upped 45 Pct

International Harvester displayed considerable enthusiasm, believes their MTA is the first tractor employing a torque amplifier to reach the market. It multiplies tractor speeds from the conventional 5 ahead and one in reverse, to 10 speeds ahead and 2 in reverse.

Throwing in the torque amplifier unit increases pull by 45 pct and reduces speed. Since the need to stop to change gears is eliminated, the increase in acreage that can be worked in a 19-hour period by the tractor is 2 to 5 acres.

## Electronics:

**1953 was industry's best year, but '54 looks even better.**

The electronics industry just doesn't know when to stop. Its cash registers rang up the best sales year in history in 1953, and industry leaders believe '54 will be even better.

Last year's bell-ringing record was spelled out last week by Robert C. Sprague, board chairman of both Sprague Electric Co. and Radio-Electronics-Television Manufacturers Assn. Speaking to the New York Society of Security Analysts, he reported:

"Last year the electronics industry did more business than in any previous year in its history, including the peak period of World War II. The total value of products made by the industry was approximately \$5 billion as compared with about \$4.2 billion in 1952 and a previous high of \$4.6 billion in 1944. The increase of 20 pct over 1952 was a combination of 6 pct larger radio-television volume and a 25 pct increase in military electronic equipment. The smaller but growing markets for industrial equipment and replacement parts also contributed to the rise."

Mr. Sprague was confident of continued high sales for both television and radio, although admitting that talk of color television had been a major factor in the slump in black and white sets in last quarter '53. But he believes that the public is now better informed on the subject, realizing that color sets will be considerably more expensive for some time to come.

He minimized production cutbacks in '53, pointing out that retail sales had been at virtual peaks throughout the year. What cutbacks there were, he said, were made to prevent overloading inventories. Recent weeks have seen a revived interest in black and white sets, and, Mr. Sprague reported, "if this trend continues, the inventory situation may have corrected itself in another month or two."

The military has been the industry's best customer since Korea, Mr. Sprague revealed, and will probably continue to be through this year at least.

He summed up the industry outlook by saying:

"To sum up the outlook for 1954, I shall be surprised if the electronics industry does not chalk up another increase in total sales. In view of the fact that there may still be some confusion in the minds of the public about color, there may be a drop of modest proportions in sales of TV sets, especially if unemployment continues to increase and consumer purchasing power is impaired. However, past experience has shown that the public will buy television and radio sets if they are competitively priced and well merchandised, and recent surveys of consumer buying intentions indicate that many people consider 1954 a good year in which to buy durable goods . . ."



Robert Sprague: "Another increase."

## **JOBS: Detroit Now Has Labor Surplus**

**Economic readjustment plus seasonal slump hit employment in Motor City . . . Spring sales boom expected to cut jobless ranks . . . UAW wants guaranteed wage—By R. D. Raddant.**

Periodic employment problems aren't anything new to Detroit and the auto industry. Ever since the first auto salesman discovered it was nearly impossible to sell a shiny new car when the roads are ice-covered or muddy, the seasonal problem has been with the industry.

Now, with 121,000 unemployed in and around Detroit and 200,000 in Michigan, Detroit is the first large industrial center to become a labor surplus area, officially so designated by the Dept. of Labor.

### **Labor Force Inflated**

The situation is in sharp contrast to a year ago, when the auto industry was engaged in a production race that brought employment to a peak and made Detroit a labor shortage area. But since the market ran out of gas last fall, unemployment has been on the increase and the seasonal slump has aggravated it.

Because of the seasonal factor, it is difficult to determine how much unemployment is due to the sales and production cycle and how much is due to more serious economic factors.

Some unemployment had to be anticipated when the bulge in demand traceable to controls and the lengthy steel strike in 1952 was dissipated. Automakers recruited labor, high wages and overtime drew thousands of workers from the South, and housewives deserted their kitchens to get extra money for the home. This created an inflated auto labor force.

### **Upswings Come Fast**

Early in February, the Michigan Employment Security Commission said that 8595 claims were filed against Michigan from workers who had returned to their home states. Many of these claims barely satisfied the 14-week minimum

work period required to file an unemployment claim, an illustration of the transient nature of a large number of workers.

It would have been completely unrealistic to expect the same labor force to be on the job in a 5-million-car year as in a 6-million-car year like 1953.

Seasonal upswings can come as fast in Detroit as can seasonal depressions. This is what prompted Defense Secretary C. E. Wilson to state that "Detroit is well able to look after itself. I wouldn't worry about it."

### **Not Enough Output**

Nevertheless, President Eisenhower was quick to interject that Detroit was eligible to get preferential treatment on defense contracts even while his Defense Secretary implied that no new contracts were coming Detroit's way.

The single recent defense contract — jet engine parts to be made by Hudson—was negotiated and approved before the current controversy. Cancellations of defense work have not contributed too greatly to Detroit's unemployment. Major cancellations came before plants were actually completed in many cases.



"About your work, Rudley . . . don't you think you should do some?"

Auto leaders have been unanimous in predicting a good year for 1954, perhaps the third biggest year in total production. But critics now charge that this isn't good enough.

No upsurge in employment before late April or May is now anticipated, as unemployment is expected to remain at the current high level until the spring sales boom results in higher production.

### **Seek Guaranteed Wage**

There have been some rumblings in labor ranks about automation. However, the annual productivity factor in UAW (CIO) contracts has kept this from becoming an issue and it is not considered much of a factor in future labor negotiations.

But the guaranteed annual wage is something else. The groundwork was laid by Mr. Reuther and other UAW officials last year when they charged that high production rates would result in unemployment later. This, of course, is the buildup for the demand that everyone knows will come up in the auto industry in 1955 when the 5-year contracts expire.

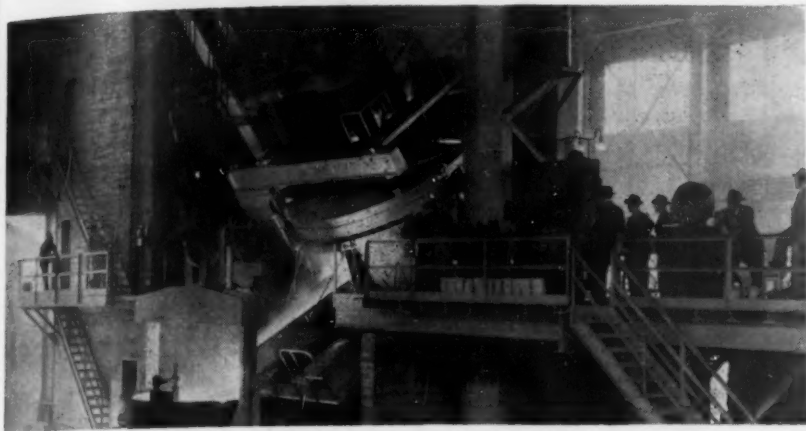
Guaranteed annual wage or not, the auto industry would like nothing better than a more stable employment year. A return to fall model introductions should have some effect in smoothing out production, but the very nature of the beast prevents a completely level year except in a market where demand exceeds supply.

### **Steel Payroll Set Record in '53**

Total payroll of the iron and steel industry last year hit an alltime high of \$3.35 billion, estimates American Iron and Steel Institute. This figure more than equals the combined payrolls for 1945 and 1946.

Average hourly pay per worker was \$2.267, an 11.9¢ increase over the 1952 figure. Workweek during 1953 averaged 39.4 hours.

Institute estimates total employment for the year at 682,800 a new high.



Electrics get new attention as . . .

## Steel Engineers Outline Progress

**Western Steel Engineers meeting breaks all records . . . Describe punch-like mechanical extrusion press . . . High pressure gas fuel atomization boosts openhearth output.**

Western steel engineers rallied their forces in Los Angeles last week and were amazed to see how they had grown.

Although western membership in the Assn. of Iron and Steel Engineers in 1943 was no more than a dozen, 431 registrants from as far away as Dallas and Vancouver, B. C., attended the group's first western meeting last week. Westerners were amazed at the turnout and 107 Easterners gained new appreciation of how their western cousins overcome their special problems.

Preliminary plans are being laid for a 1955 meeting in San Francisco. Total western membership is now about 350.

### Extrudes Like Punch Press

Paper which aroused greatest response was a discussion of vertical mechanical extrusion presses by Astor L. Thurman of Mannesmann-Meer Engineering and Construction Co., Easton, Pa., which intends to market them in U. S. based on German experience.

The latest 2200-ton model of this press has a 11-ft diam, 16-ton flywheel and crankshaft arrangement similar to a punch press. Under normal conditions the press is expected to handle pipe from  $\frac{3}{8}$  in. to 3 in. with wall thicknesses of

0.09 to 0.20 in. of carbon and alloy steels including stainless as well as nonferrous metals.

Techniques for high tungsten have not been worked out as yet. Due to short extrusion cycle of 2.5 seconds with resultant low heating of tools, die life of 200 operations and mandrel life of 350-450 pushes is claimed and the pressing head lasts 2250 cycles.

### Cites Advantages

Remarkably high output speeds of 120-180 tubes per hour up to 60 ft long are reported with pipe up to  $\frac{3}{8}$ -in. produced in one furnace heat from billet to hot finished tube. Presses in operation extrude tubes up to 3 in. O.D. and minimum hot-finished size using a reducing mill is  $\frac{3}{8}$  in.

Best lubricant found so far is graphite oil "and a low cost ingredient." Early carburization is no longer a problem and no post-extrusion cleaning of tools is necessary as with glass lubricant. Troublesome salt bath preparation and hydraulic system maintenance are also eliminated.

In several discussions following the paper, members believed the press could be competitive on higher alloys if tonnage can be accumulated but find it more difficult on carbon stock. Surface quality due

to high speed was also questioned. Some bars and structurals have been run experimentally.

### Case for Electrics

Sunday punch for electric furnaces was thrown by W. B. Wallis, president of Pittsburgh Lectromelt Furnace Co., who quoted the recent Battelle Memorial Institute study to show heat loss in stack gases on openhearth per ton is about equal to total heat used in making a ton of steel in electric furnaces. He added that while overall energy requirements for electrics cost about \$4 per ton more than openhearth, the electrics have a \$4 advantage in lower costs per charge and lower carrying charges on investment.

Mr. Wallis also said the electrics' greatest future lies in invading hot metal mills. A Canadian firm, he said, is installing an oxygen top-fired converter to blow hot metal preliminary to charging it into the electric furnace. Another mill is using 40 pct hot metal charges with 10 pct increase in hourly tonnage.

Another producer, he said, is installing a blast furnace with 2 top-fired oxygen converters for blowing down hot metal for use in arc furnaces. He added that, if lining wear can be overcome, electrics may some day be used as converters. Secondary roofs can be used with fume exhausts and oxygen jets. For completing the heat, auxiliary covers with the electrodes would be swung back in position. Present 11 to 12-ft diam shells are easily removable for relining but the desirability of this on 20-ft furnaces is questionable, he said.

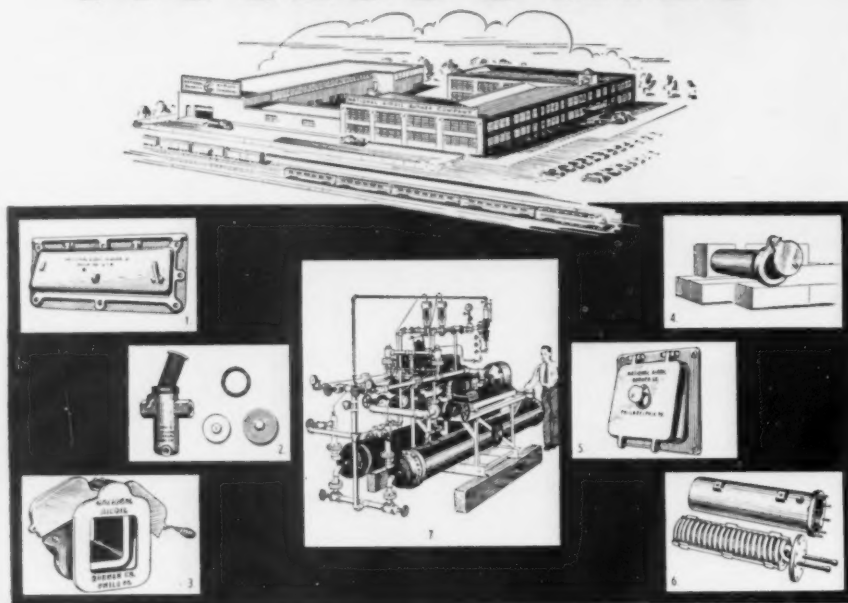
### Mill Speeds Higher

A new type magnetic amplifier system tension regulator installed on the Kaiser 44-in., 4000-fpm 2-stand temper mill, has exceeded expectations, according to W. R. Harris and L. F. Stringer of Westinghouse. Speed and accuracy are its principal advantages and results found satisfactory by experience can be consistently duplicated. A Kaiser representative said the record of the unit renders previous air-operated types obsolete.

Recent trends toward mills in the



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INDUSTRIAL OIL BURNERS, GAS BURNERS, FURNACE EQUIPMENT

## Production

6000 to 7000-fpm class have mostly required development of motors, drives, spindle couplings and other parts with little or no fundamental change in basic mill design, according to R. E. Noble, Mesta Machine Co., West Homestead, Pa. He added that sustained production rates on tinplate gages now run 4500 to 5000 fpm with output of 70 to 85 tons per hour with record high of over 100 tons.

Use of special nozzles to atomize liquid fuels by high pressure gas raised steel production in open-hearths 8.2 pct at Colorado Fuel & Iron Corp., according to George Grosvenor, openhearth superintendent at Pueblo. In the second month the furnace hit a gain of 15.6 pct. In the second period hot metal charge was increased from 46 to 56 pct.

Bottom section of the burner is essentially a venturi with air port through the burner shell, opening inside the furnace, which permits use of superheated air from the uptakes. Latest models use either steam, air, natural gas or any combination to atomize the fuel with best results shown by natural gas at 140 psi on both top and bottom burners.

## Study Replacement Costs

Basic western overcapacity in merchant bar mills was highlighted by W. J. McClung of Bethlehem Pacific. Capability of West Coast plants in this category is nearly 3.25 million tons but the best they have ever been required to turn out was 1.7 million tons in 1953. Mills are forced to handle an amazing variety of shapes to keep equipment operating full time.

Close scrutiny of operating costs on older machinery with a view to economic replacement was urged by G. G. Beard, United Engineering & Foundry Co. president. Reviewing the Machinery & Allied Products Institute formula which systematizes operation vs. replacement costs, he said an IRON AGE questionnaire (in 1947) disclosed plant managers varied from 10 to 100 pct in estimates of how much a new machine would have to save over an old one before they would buy it.

# NICKEL: Don't Expect More in '54

Nondefense nickel users will get less in first half than last half '53 . . . Second half depends on military stretchout . . . Stockpiling won't be slowed—By A. K. Rannells.

It is becoming increasingly clear that consumers of nickel for non-defense purposes should not expect any increase in their share of the available supply during 1954.

Also, it is virtually certain that their share during first-half 1954 will be smaller than they received during last-half 1953. (See THE IRON AGE, Feb. 11, p. 67.)

Best official estimate now is that the overall nondefense supply for 1954 will add up to a little more than 100 million lb.

Some think there might be an additional 5 million lb from increased output under expansion programs—but it must be kept in mind that 85 pct of such production at present is being shipped to the stockpile.

## Will Get 12 Pct Less

There is no question that the flow of nickel to the national stockpile is the largest single factor in restricting nondefense supply. Stockpiling rate has been boosted by a federal inter-agency decision.

Actually, after 1954 stockpiling orders are filled from available production, it looks as if there will be 24 million lb less for defense, atomic energy, and civilian consumption than last year. The 1953 figure was 197 million lb.

This means that whether civilian supply for 1954 matches the 1953 level apparently hinges on whether stretchouts in the defense program will release 24 million lb of nickel.

A top mobilization official told THE IRON AGE there is to be no change in the current stockpiling rate. And, he adds, these schedules will be adhered to "even if it should mean further cuts in the civilian supply."

## Prefer Nickel Sinter

Recent government orders to Nicaro to release 500,000 lb a month to civilian channels doesn't change the picture. At the same time, International Nickel Co. was directed

to increase its stockpile shipments by exactly the same amount as was released from Nicaro.

Since this left the civilian supply right where it had been, apparent reason for the switchabout is a technical one. The government would rather stockpile Inco's sintered product than Nicaro's powdered oxides.

## Study Market Effects

A review of stockpiling objectives, including nickel, is now underway at the Office of Defense Mobilization and is due for completion not later than May 1.

This isn't likely to change the stockpiling rate. The inter-agency decision which boosted nickel stockpiling also recommended maintaining the new rate for the next several years.

The reason, according to ODM Director Arthur S. Flemming, is that the recently stepped up procurement was necessary because of the "unsatisfactory" acquisition rate since 1946. This resulted in a dangerous deficit in stockpile inventory.

Meanwhile, a Senate subcommittee under chairmanship of Senator George W. Malone, R., Nev., last week began an overall check of the

nickel supply, stockpiling procedures, and complaints that non-defense users, particularly small business, are being squeezed.

Civilian users are highly concerned since they have been notified by their suppliers that current delivery rates must be reduced by as much as one-third. They say this works new hardships, especially on those with no defense contracts for support.

Platers are especially hard hit, the committee has been told. They say they were already getting only about 40 pct of normal needs and the pending cutbacks will force shutdowns.

## Resell For Profit

Especially disturbing is complaint that the gray market is again raising its head. Several firms told the committee they had received offers of as much nickel as they needed—at double the market price.

Some believe that sharpeners may be trying to sell supplies, legitimately allocated to them, at a handsome profit. There is a belief that some of it may be coming from New Caledonia or other foreign source.

Attitude of the ODM is that since removal of direct controls last October, the agency's job is confined to cutting the nickel pie three ways—stockpiling, defense set-asides, and civilian supply.

As the ODM sees it, division of the civilian leftover is strictly up to industry. If users feel that these divisions are unfair, ODM suggests that complaints should be made to the Secretary of Commerce.

Director Flemming says that the nickel industry committed itself to a fair and equitable division of nickel supplies among nondefense users. He thinks industry is doing the best it can.

He has asked the Malone committee to bundle up the complaints it has received and send them to ODM, however. Should evidence develop that unfair divisions are being made and likely to continue, he said, he would have no "hesitation in recommending that (nickel) controls be reimposed."



"Selective breeding, I suppose?"

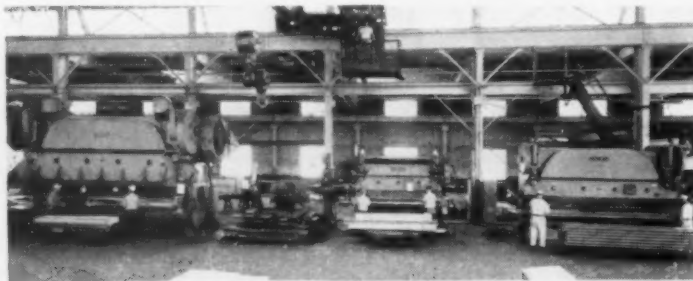
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## Packaging

### Tape:

**Sharon adds pressure tape to steel strapping tape line.**

Sharon Steel Corp.'s Brainard Steel Div. will soon chalk up a first in customer service which officials hope will bring in millions of sales dollars. Brainard will start shooting at new markets on April 1 when a new line of pressure sensitive filament and gummed strapping tapes will be made available.

By adding filament-reinforced strapping tape to its steel strapping and dispensing products Brainard will offer complete and unbiased service packaging and materials handling.

Addition of the strapping tape should simplify materials handling solutions which have often proved costly and inefficient in the past. Salesmen equipped with both strapping tape and steel strapping will not have to push any one line.

Brainard's decision to enter the strapping tape field has been in the development stage for well over a year. Officials close to the program say several hundred thousand dollars have already been spent. Until now tape has been chiefly handled through jobbers. It did not become a factor in materials handling until Korea. Compared to steel strapping, tape is still in its infancy.

#### Steel's Knowhow Helps

In entering this new merchandising field Brainard officials emphasize that they do not intend merely to supplement production of steel strapping and dispensing items. Instead they are planning to develop and expand strapping tape applications while continuing to supply steel strapping.

Brainard's strapping sales manager Frank E. Houck told THE IRON AGE he expects sale of tape to increase steel strapping sales.

Generally speaking the new development at Brainard should parallel the current situation in plastic pipe. Firms already making strapping tape are not generally unhappy. They feel Brainard's entry will speed up process of finding new outlets.



# Employers Must Get Tough In '54

Management must take firm stand on GAW, fringe benefits, experts tell AMA conference . . . Slichter urges more liberal jobless benefits instead—By K. W. Bennett.

Storm clouds rolled over Chicago last week as personnel specialists forecast the 1954 labor-management climate.

Management must be prepared to negotiate on the guaranteed annual wage issue and with "positive action, not delaying or harassing tactics," said C. Wilson Randle of Booz, Allen & Hamilton, speaking at the American Management Assn.'s national personnel conference.

## Settle for Fringe Benefits

There is little doubt that the major unions will give the guaranteed annual wage a high position on their bargaining agenda, Mr. Randle felt. But unions are having a rough time putting their memberships back of the guaranteed annual wage issue. Primarily, because times have been good, employment up.

His forecast: Unions will yield the issue in favor of benefits that will produce more immediate results—liberalized pensions, non-contributory insurance, frozen cost-of-living gains, and direct wage increases. Main effort will be to secure a contract foothold, insert a wedge that will provide the basis for a guaranteed annual wage to their liking later.

## Warn on Concessions

A possible long-range alternative was suggested by Dr. Sumner Slichter, Harvard University, who felt that employers should push liberal state unemployment compensation programs. He said that more widespread unemployment compensation would reduce guaranteed wage pressure on employers already under fire for increased fringe benefits, as indicated by Mr. Randle.

And there was warning that too many minor concessions are already being made. "Avoid as you would the plague," said W. A. Kis-

sock, Hotpoint Co., "the type of concession made for no other reason than as a response to bargaining pressure with the thought that, well, it won't cost much this year because not many of our employees are eligible. . . ."

This year, he believes, management will have to bargain tightly, publicize those concessions that it does make. He expects union tightening of provisions covering job standards, work assignments, seniority, transfer, layoff. Other likely demands include more union participation in time-study programs, more paid holidays, more sick benefits, more catastrophe insurance. Something new, and loaded, will be union demands to restrict the transfer or establishment of operations in other localities.

## Buyers:

### Increasing optimism noted at Chicago Products Show.

Who said recession? Outstanding note at last week's Products Show at Chicago, twentieth annual exhibit sponsored by the Purchasing Agents of Chicago, was a kind of climbing optimism.

Most attendees reported their own inventories of raw materials and finished goods were in fairly good shape—this was particularly true of the many medium-sized steel warehouses represented. Most were finding their rate of inquiries was picking up slightly, and a fair percentage expected to see new business arising as a direct result of the show.

Raw materials inventories were indicated to be moving back to a level that looked healthy in a generally slower business scene. Warehouses were notable in expressing greater satisfaction with their inventory situation. At least two warehouses were preparing to



SUMNER SLICHTER: Employers should work for more liberal unemployment compensation benefit programs.

take on new product lines (a growing number are interested in aluminum). Others were adding floor space and processing equipment. A few are at least talking about opening new branches in areas they don't at present serve.

But reports indicated that, while some areas of the business scene are sunnier, others remain dark. For instance, there's been a healthy increase in the amount of job slitting being done by small warehouses, partly attributable to consumers who are taking old steel out of inventory and retailoring the material to meet their current size demands rather than ordering new shipments from the mill. Slitting itself has become more profitable, despite an increase in competition.

### Get Quick Mill Delivery

A scattering of new warehouse steel orders has resulted as plants called in jobbed stampings, handled the work in their own shops, and bought steel against this new demand on their home plant steel inventories.

Everybody finds mill steel, including almost any kind of plate, available on short delivery, and the same applies to stainless. The fear of a nickel-stainless shortage appears to be on the fade, with that item still available on 4 week delivery.

# Top 100 Firms Receive 64 Pct of Defense Contracts

Orders placed with 100 companies and corporate groups accounted for 64 pct of the dollar volume of military prime contracts placed in the 36 months from July 1950 to the end of June 1953, latest Defense Dept. figures show. Dollar

volume of the top 100 firms' share was \$63,165,600,000 out of an overall total of \$98,723,000,000.

Seventeen companies received 1 pct or more of total awards, and 9 received 2 pct or more. Of the top 17 firms with 1 pct or more, 11 are

involved in the aircraft industry.

General Motors Corp. was the largest single prime contractor with 7.2 pct of the total. Following were Boeing Airplane Co. with 4.4 pct and General Electric Co. with 3.6 pct.

Company	Millions Of Dollars	Pct Of Total	Cumulative Pct Of Total	Company	Millions Of Dollars	Pct Of Total	Cumulative Pct Of Total
TOTAL—All Contracts*	\$98,723.0	100.0	100.0	50 Newport News Shipbuilding	246.4	0.3	56.3
TOTAL—100 Companies	63,165.6	64.0	64.0	51. Federal Cartridge Corp.	245.6	0.2	56.5
1. General Motors Corp.	7,095.8	7.2	7.2	52 Food Machinery & Chemical	236.2	0.2	56.7
2. Boeing Airplane Co.	4,402.9	4.4	11.6	53. United States Steel Corp.	224.2	0.2	56.9
3. General Electric Co.	3,459.2	3.6	15.2	54. Beech Aircraft Corp.	215.7	0.2	57.1
4. Douglas Aircraft Co.	2,867.8	2.9	18.1	55. General Tire & Rubber Co.	211.6	0.2	57.3
5. United Aircraft Corp.	2,816.4	2.8	20.9	56. Swift & Co.	210.1	0.2	57.5
6. Chrysler Corp.	2,199.9	2.2	23.1	57. Bethlehem Steel Corp.	210.0	0.2	57.7
7. Lockheed Aircraft Corp.	2,152.1	2.2	25.3	58. Piasecki Helicopter Corp.	209.9	0.2	57.9
8. Consolidated Vultee Aircraft	2,072.1	2.1	27.4	59. Standard Oil Co. of California	204.4	0.2	58.1
9. North American Aviation, Inc.	1,931.6	2.0	29.4	60. National Gypsum Co.	202.3	0.2	58.3
10. Republic Aviation Corp.	1,877.7	1.9	31.3	61. Armour & Co.	191.3	0.2	58.5
11. Curtiss-Wright Corp.	1,746.2	1.7	33.0	62. Rheem Manufacturing Co.	187.7	0.2	58.7
12. Ford Motor Co.	1,604.8	1.7	34.7	63. Remington Rand Inc.	184.2	0.2	58.9
13. American Tel. & Tel.	1,491.8	1.5	36.2	64. Diamond T Motor Car Co.	175.5	0.2	59.1
14. Westinghouse Electric Corp.	1,348.2	1.3	37.5	65. Norris-Thermador Corp.	172.2	0.2	59.3
15. Grumman Aircraft Engineering	1,043.6	1.1	38.6	66. American Bosch Corp.	167.4	0.2	59.5
16. Northrup Aircraft, Inc.	999.0	1.0	39.6	67. Allis-Chalmers Mfg. Co.	164.2	0.2	59.7
17. Bendix Aviation Corp.	940.5	1.0	40.6	68. Silas Mason Co.	163.2	0.2	59.9
18. Sperry Corp.	925.4	0.9	41.5	69. Hazeltine Corp.	159.6	0.2	60.1
19. Kaiser Motors, Inc.	897.6	0.9	42.4	70. Massey-Harris Co., Ltd.	159.4	0.2	60.3
20. American Locomotive Co.	812.8	0.8	43.2	71. U. S. Hoffman Machinery Corp.	158.9	0.2	60.5
21. McDonnell Aircraft Corp.	679.7	0.7	43.9	72. Minneapolis-Honeywell	157.7	0.2	60.7
22. Radio Corp. of America	664.6	0.7	44.6	73. North Atlantic Constructors	156.0	0.2	60.9
23. Glenn L. Martin Co.	643.2	0.7	45.3	74. Sylvania Electric Products, Inc.	149.5	0.2	61.1
24. International Harvester Co.	628.5	0.6	45.9	75. Pacific Car & Foundry Co.	148.1	0.2	61.3
25. Hughes Tool Co.	622.4	0.6	46.5	76. Baldwin-Lima-Hamilton Corp.	146.0	0.2	61.5
26. E. I. DuPont De Nemours & Co.	586.4	0.6	47.1	77. Burlington Mills Corp.	145.5	0.2	61.7
27. Studebaker Corp.	581.5	0.6	47.7	78. National Cash Register Co.	137.3	0.1	61.8
28. Bell Aircraft Corp.	504.7	0.5	48.2	79. Day & Zimmerman, Inc.	133.6	0.1	61.9
29. Avco Manufacturing Corp.	455.8	0.5	48.7	80. B. F. Goodrich Co.	133.2	0.1	62.0
30. Hercules Powder Co.	441.7	0.5	49.2	81. American Smelting & Refining	132.9	0.1	62.1
31. Goodyear Tire & Rubber Co.	440.8	0.5	49.7	82. Procter & Gamble Co.	131.3	0.1	62.2
32. Packard Motor Car Co.	439.0	0.4	50.1	83. Admiral Corp.	131.0	0.1	62.3
33. Int'l. Telephone & Telegraph	430.4	0.4	50.5	84. Gilfillan Brothers Inc.	130.9	0.1	62.4
34. Firestone Tire & Rubber Co.	424.6	0.4	50.9	85. American Steel Foundries	127.3	0.1	62.5
35. Olin Industries, Inc.	414.5	0.4	51.3	86. Caterpillar Tractor Co.	126.1	0.1	62.6
36. Eastman Kodak Co.	413.1	0.4	51.7	87. Cities Service Co.	125.5	0.1	62.7
37. Nash-Kelvinator Corp.	397.5	0.4	52.1	88. Stewart-Warner Corp.	124.0	0.1	62.8
38. Fairchild Engine & Airplane	371.1	0.4	52.5	89. Borg-Warner Corp.	123.3	0.1	62.9
39. American Car & Foundry Co.	344.4	0.4	52.9	90. Sinclair Oil Corp.	123.3	0.1	63.0
40. Philco Corp.	338.8	0.4	53.3	91. Motorola, Inc.	122.5	0.1	63.1
41. Collins Radio Co.	332.2	0.3	53.6	92. Fruehauf Trailer Co.	121.9	0.1	63.2
42. Raytheon Manufacturing Co.	318.6	0.3	53.9	93. N. Y. Shipbuilding Corp.	121.6	0.1	63.3
43. Reo Motors, Inc.	311.5	0.3	54.2	94. American Safety Razor Corp.	121.0	0.1	63.4
44. Int'l. Business Machines Corp.	297.5	0.3	54.5	95. Mack Trucks, Inc.	120.3	0.1	63.5
45. United States Rubber Co.	289.0	0.3	54.8	96. American Machine & F'd'ry.	115.7	0.1	63.6
46. J. P. Stevens & Co.	282.3	0.3	55.1	97. Bath Iron Works Corp.	114.3	0.1	63.7
47. American Woolen Co.	277.8	0.3	55.4	98. Sun Oil Co.	106.6	0.1	63.8
48. Continental Motors Corp.	259.4	0.3	55.7	99. Phillips Petroleum Co.	104.1	0.1	63.9
49. Standard Oil Co. of N. J.	255.5	0.3	56.0	100. Bowen & McLaughlin Co.	103.2	0.1	64.0

\*Army, Navy and Air Force contracts awarded in Continental U. S., excluding all contracts of less than \$5000; Army and Air Force contracts of \$5000 to \$10,000 since Dec. 31, 1950; and Navy contracts of \$5000 to \$10,000 since June 30, 1951.

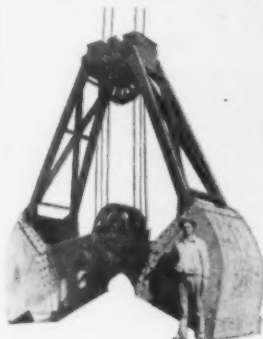
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# **THE WELLMAN ENGINEERING COMPANY**

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February 25, 1954



# Industrial Briefs

**"Suburb Ho" . . . LINDBERG ENGINEERING CO.** has moved its Detroit office into a new modern office in the suburbs at 1220 South Woodward Ave., Royal Oak, Mich. Frank J. Condit is head of the office.

**Safety Award . . . REPUBLIC STEEL CORP.'s** Southern District received an award for having the best safety record among all Republic's coal mines during 1953.

**Newly Formed . . . THE TIMKEN ROLLER BEARING CO.,** Canton, Ohio, has formed a new company, Timken Roller Bearing De Mexico, to handle the sale of its products. A. E. Porter, was appointed manager.

**Available . . . GENERAL ELECTRIC CO.'s** Carboloy Dept., Detroit, now has available, in a wide range of standard, stock blanks, its new cemented carbide grade 370 for heavy duty steelcutting.

**Highly Honored . . . Two executives** of WESTINGHOUSE ELECTRIC CORP.'s Small Motor Div., Lima, Ohio, have been awarded the Westinghouse Order of Merit for their contributions to electrical progress in the aviation industry.

**Making History . . . ELECTRO REFRACTORIES & ABRASIVES CORP.,** Buffalo, reports net sales of \$4,986,714, for 1953 were the best in the company's 34-year history.

**Lead Coating . . . U. S. STEEL CORP.,** U. S. Steel Supply Div., Chicago, is stocking a new type rust preventative lead coating known as Blakled, designed to prevent steel corrosion.

**New Company . . . BRIDGE & TANK CO. of Canada Ltd.,** has been formed to operate the merged Hamilton Bridge Co. and Vulcan Iron & Engineering Ltd.

**Appointed . . . AIR POLLUTION CONTROL ASSN.** appointed Harry C. Ballman executive secretary.

**"Excellent" . . . SPRAGUE ELECTRIC CO.** has been rated as "excellently managed" by the American Institute of Management for the second consecutive year.

**Expansion . . . HANSON - VAN WINKLE - MUNNING CO.,** Matawan, N. J., in a move to expand its West Coast activities has acquired Electroplating Equipment & Supply Div. of the A. J. Lynch Co., California.

**New Distributor . . . FIRTH STERLING INC.,** Pittsburgh, has named Denman & Davis, N. Bergen, N. J., exclusive distributor of tool and die steels in that area.

**Opened . . . THE NATIONAL SUPPLY CO.** has opened a new oil field supply store at Big Spring, Tex. B. D. Pounds has been appointed manager.

**To Erect . . . CLARK EQUIPMENT CO.,** Buchanan, Mich., plans to erect a new plant on the outskirts of Benton Harbor, Mich. Construction will start immediately on a 100-acre tract of land and the plant is expected to be in operation before the end of 1954.

**Big Year . . . SERVEL, INC.** employees received \$15,868 in 1953 for ideas on improving the company's products and production methods.



**CONSTRUCTION** will soon get under way on this bridge across the Straits of Mackinac connecting Michigan's two peninsulas. American Bridge will build it.

**Plant Completed . . . TORRINGTON MANUFACTURING CO.,** Torrington, Conn., has completed a new plant in Oakville, Ont. for its wholly-owned subsidiary, Torrington Mfg. Co. of Canada, Ltd.

**Increased Facilities . . . ALUMINUM CO. OF AMERICA** has completed expansion of facilities at the Mobile Alumina Works, Mobile, Ala. Capacity of the plant was increased 33 pct during the expansion program that began in October, 1951.

**Closes Mine . . . THE AMERICAN ZINC CO.** will close its mine near New Market, Tenn., on Mar. 1. About 80 workers will be laid off. The company has also closed two of its mines near Jefferson City, Tenn.

**Established . . . R. M. REICHL CO.,** has been established and will specialize in development engineering, process-development and consulting, at 110-11 Seventieth Road, Forrest Hills, L. I.

**Gets Contract . . . American Bridge Div. of U. S. STEEL CORP.,** New York, has been awarded the contract for fabrication and erection of the structural steel for a new office building at the site of the Pennsylvania Railroad's old Broad St. Station in Philadelphia. Construction award went to Uris Bros. of New York.

**Outstanding . . . STEVENS INSTITUTE OF TECHNOLOGY** has chosen Richard H. DeMott, chairman of the board and president of SKF Industries, Inc., Philadelphia, to receive the Stevens Honor Award bestowed each year by the Institute on outstanding figures in American life.

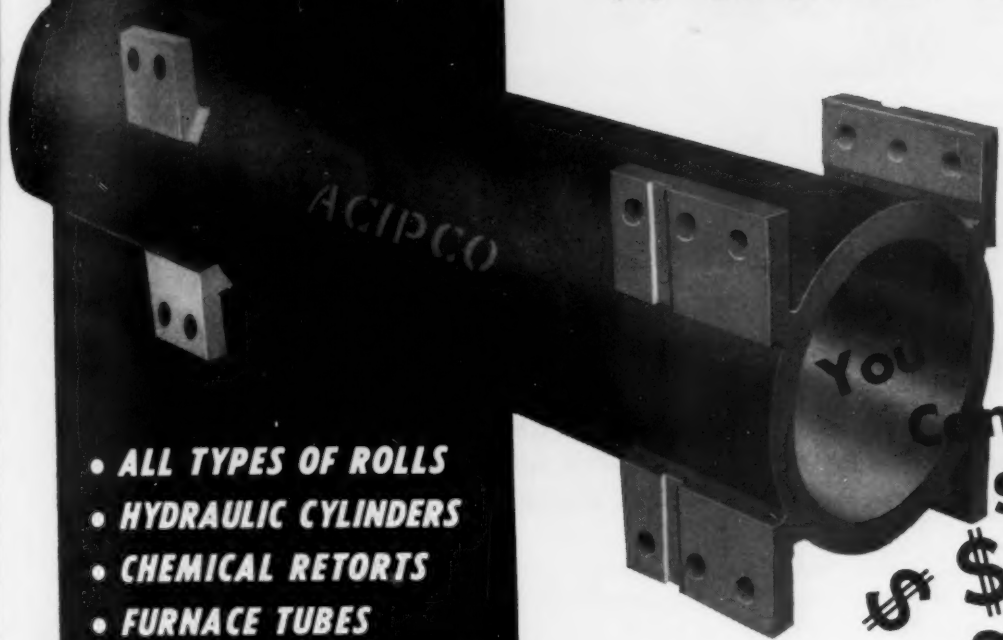
**Acquired . . . LOBDELL UNITED CO.,** subsidiary of United Engineering & Foundry Co., Wilmington, Del., has acquired Bridgeport Safety Emery Wheel Co. Inc., and Diamond Machine Company.

**Adds Division . . . MARS ENGINEERING, INC.,** Newark, N. J., has added a new division which will design industrial dust collection and fume elimination systems.

**Declared . . . CLEVITE CORP.,** Cleveland, declared a dividend of 25¢ a share on common stock, payable Mar. 10.

# STOP!

## .. Going In The Hole on HOLE COSTS!



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- CHEMICAL RETORTS
- FURNACE TUBES
- MANY OTHER INDUSTRIAL APPLICATIONS

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tubes have a decided advantage over hollow-bored forgings. Wall thicknesses range from .25" to 4".

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# The Automotive Assembly Line



## Ford Unveils Answer to Corvette

**Thunderbird to go into production next fall . . . End Chevrolet monopoly of field . . . But Ford's "personal car" is more conventional . . . Corvette weighs more—By R. D. Raddant.**

Ford's answer to the Corvette emerged from careful concealment last weekend and served notice that Chevrolet's monopoly of this specialized field will end next fall. That is the tentative date when the Thunderbird, as it will be called, will go into production.

It has been no real secret in Detroit that Ford had plans for several thousand cars in the sports car field this year. In fact, some of the most advanced information was planted by the competition. But detailed plans were well guarded and few outside Ford styling and engineering had much of an idea of what was in the works.

**More Conventional . . .** While the Thunderbird's appearance is as radically new as the Corvette's, Ford engineers went a long way to make it a more conventional model. As a result, most of its major parts are interchangeable with regular Ford cars and the Thunderbird can be serviced at Ford service garages.

Its body is steel, built along conventional body construction methods. In this respect it is much less an experimental car than the Cor-

vette. In the Corvette, Chevrolet engineered a completely different car and its major purpose was as an experiment in plastic body construction. Only secondary was its advance into the sports car market previously unprobed by a major manufacturer.

**"Personal Car" . . .** Ford declines to use the term "sports car," preferring to describe the Thunderbird as a "personal car." It's possible, then, that the Thunderbird is more in line with future Ford styling trends than the Corvette, which is a much wider departure from Chevrolet's construction and styling.

While the cars have many points of similarity, it could be said that Ford and Chevrolet got there by completely different routes.

The Thunderbird is powered by a 160 hp Y-block V-8 engine with 256-cu-in. displacement, a 4-barrel carburetor and dual exhausts. The door tops are only 33.7 in. from the ground and overall height is 51.5 in., nearly a foot lower than the Ford sedan, although road clearance of 5.5 in. is only slightly less than standard Fords. Wheelbase is 102 in., overall length is 175.5 in., and weight is 2837 lb.

**Weights Less . . .** For comparison, the Corvette is powered by a 150-hp in-line 6-cylinder engine. Height is 33 in., wheelbase 102 in., overall length 167 in., weight 2900 lb and road clearance 6 in.

The surprise in physical measurements is the lighter weight of the Ford, since the Corvette's plastic body presumably is pounds less than a steel body. The Corvette has a heavier frame and engine.

The Thunderbird is also a single seater, but does not employ bucket seats. There is normally room for a third passenger although the transmission has its selector lever on the floor.

**Show New Mercury . . .** Something completely new in the Thunderbird is an adjustable steering column which telescopes in or out 3 in. to suit driver's reach. Adjustable steering columns are under study by several auto manufacturers, in regard to both angle and length. It has a wrap-around windshield. The car has an optional glass fiber top designed so it can be removed.

The car should have enough zip for anybody. Ford test engineers say that from a standing start the Thunderbird gains 53 car lengths on a standard 1954 Ford in 40 sec.

Along with the Thunderbird, Mercury also brought out a newly designed car, the Mercury Monterey XM-800. Benson Ford, Lincoln-Mercury general manager, says it could go into production after completion of normal tooling. However, it is still in the plastic prototype state and production plans will depend on public reaction to the spring round of auto shows. Its outstanding design feature is a concave grille. Forward-canted headlamps, angular treatment of pillar posts and fenders give a forward thrust to its appearance.

**Make Own Parts . . .** One of the most noticeable trends among automakers is a swing to manufacturing more of their own parts.

*Turn Page*



An itemizing of GM's recently announced \$1 billion expansion bundle discloses many instances where the money will be spent to manufacture parts never made previously by GM divisions. Chevrolet, for example, will soon be making some of its own frames.

**Gives Competitive Advantage...**  
Ford will soon be making transmissions at a Livonia plant originally constructed for tank manufacture. Chrysler purchased Briggs Body and will be making more of its stampings and parts in the 12 plants contained in the \$73 million purchase. One of the principal points behind any merger plan is the idea of doing more manufacture of parts.

It is still too early to determine the long range results of the trend, but many parts manufacturers have already suffered and alert ones are diversifying their operations as rapidly as possible.

At one time, and in some cases until recently, auto plants did little more than assemble parts bought elsewhere. This is a rapidly passing trend and perhaps the underlying problem that is putting independents in such a jam to compete costwise. Their larger competitors can manufacture so many more of their parts and integrate their entire operations with tremendous cost cutting efficiency.

Manufacturers are fond of saying that they are offering a better product at the same price and that this really is a price cut to the buyer. This may not ring any bell with the customer, but that has been the conventional answer to price questions.

GM President Harlow H. Cur-tice has already gone on record as stating that GM sets its price only once a year. This would be difficult statement to back down from and Mr. Curtice isn't likely to.

Best bet is that prices will be cut on parts, services, in the form of discounts from the dealer, extras and accessories, but most of the major manufacturers are likely to hold firm on list prices for some time.

## Prices:

**Major list price cuts not expected in the near future.**

While the trend is toward long range cost cutting, a lot of pressure is building up for immediate price cutting. Here and there a few dollars are nipped off the eventual cost to the buyer, but there is little acknowledgment of forthcoming cuts from the industry at large.

Nash recently lopped \$25 to \$45 from its new model price, stating it was attributed to a savings due to the end of steel premiums.

Dealers in some locations are discounting models and bait of all kinds is being extended to prospective buyers. However, no factory prices other than Nash's have been reduced after model introduction.

## Keep Ford Electrics Shut Down

A good illustration of the availability of steel for the auto industry is the shutdown status of the

## Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Feb. 20, 1954..	121,568*	24,724*
Feb. 13, 1954..	118,306	23,774
Feb. 21, 1953..	133,485	28,375
Feb. 14, 1953..	122,781	24,322

\*Estimated. Source: Ward's Reports

five electric furnaces of the Ford Motor Co.

Ford, with ten openhearth and five electric furnaces, is the only automaker to manufacture its own steel. Home production is generally 50 pct of Ford's steel consumption.

The five electrics, which were closed several months ago to coincide with blooming mill remodeling, have remained down as an economy measure. The furnaces have an annual capacity of 218,000 tons and are not of modern construction. They were constructed for the production of special alloy steels but with the availability of all types of automotive steel, operation of the five old fashioned electrics was not economical and they remained down.

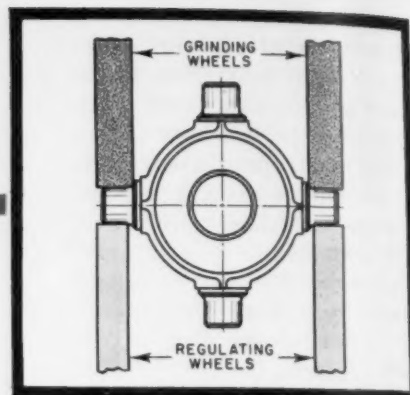
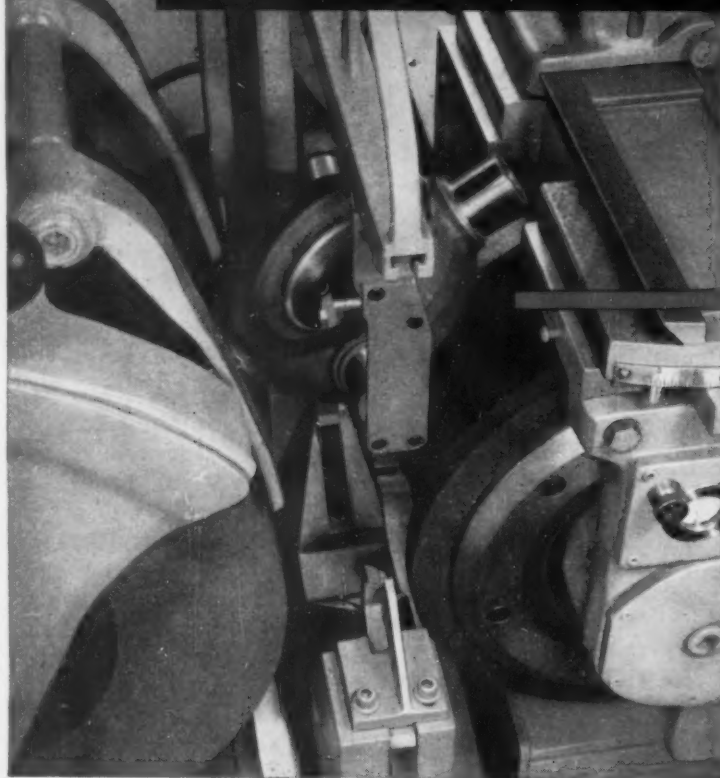
## THE BULL OF THE WOODS

By J. R. Williams



# CINCINNATI FILMATIC No. 3 CENTERLESS

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Drawing of part and arrangement of wheels. Two diameters are ground simultaneously, removing .015", .008" and .003" in three operations, on a CINCINNATI FILMATIC No. 3 Centerless Grinding Machine tooled up by Cincinnati Application Engineers.

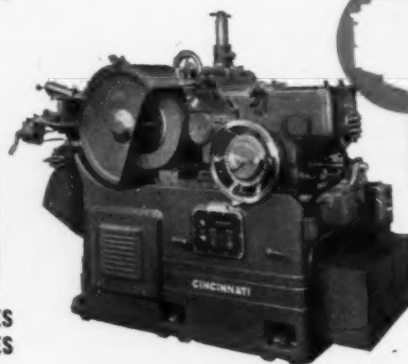
New applications for CINCINNATI Centerless Grinders are always popping up. The latest is illustrated here... a two-wheel setup to grind simultaneously two trunnion diameters on universal joint spiders. Swing required for the center section is approximately seven times the ground diameters. Cincinnati Application Engineers tooled up a CINCINNATI FILMATIC No. 3 Centerless Grinding Machine for the job. Equipment includes profile hydraulic truing units over the grinding and regulating wheels; special grinding wheel guard and regulating wheel housing to permit loading; automatic infeed attachment; hydraulically operated loading fixture; manually operated grinding wheel spindle reciprocating attachment. With the latter attachment, the operator touches up the shoulder and radius adjacent to the ground diameters. You probably have precision grinding operations in your shop that could be centerless ground on a CINCINNATI at lower cost. It will pay you to reconsider your present methods, and our Application Engineers will help you decide.

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G-570-3



**No. 4**  
Catalog No.  
G-538-2



**No. 5**  
Data on  
request



**No. 6**  
Data on  
request



CINCINNATI FILMATIC No. 3 Centerless Grinding Machine. You may obtain complete specifications by writing for catalog number G-570-3.

## Unemployment Softens Union Demands

**Loosening labor market tones down union attitude . . . See fewer strikes, more bargaining, smaller pay boosts . . . Labor to put stress on pensions, insurance benefits—By G. H. Baker.**

Fewer strikes, longer wage negotiation periods, smaller pay rises. That's to be the general pattern of labor-management bargaining talks in the months ahead. Threat of unemployment in a loosening labor market is the determining factor.

Unions will emphasize pension and insurance benefits in future negotiations. Wage rises may play second fiddle to security, except in those cases where union officials believe they can score an increase. Unions in some areas, particularly in New England textile centers, are reluctantly agreeing to pay reductions as the alternative to plant shutdowns.

But all demands for higher wages are not being dropped. Far from it. Some union officials reason that the end of the excess profits tax, coupled with a possible easing on Apr. 1 of at least several percentage points in the corporation income tax rate, has the effect of "softening up" employers for substantial wage demands.

**Rough Year Ahead . . .** Aggressive merchandizing, plus extra sales inducements, will probably push 1954 sales records comfortably into the profit column, but 1954 will be a rough year, competitively speaking.

Government economists base this forecast on the latest production and sales figures for key manufacturing and distributing industries. They note that metal fabricating, for example, decreased somewhat last month. Automobile production rose substantially in January, following the model changeover period, but fell off somewhat early this month.

Manufacture and processing of petroleum and chemicals continues at what the Federal Reserve Board calls "advanced rates." Construction work continues to advance at the same high rate set in late 1953. And retail sales figures are holding up "remarkably well," despite declines in the total number of employed persons.

Heavy inventories of goods, particularly in the automotive industries, are the biggest problem today. But spot-checks of business opinion show that the majority of businessmen do not expect the top-heavy inventory situation to last long.

Difference between this year and last, however, is that customers will have to be sold this year. Real salesmanship will be called into play. Actually, the worse part of the downturn is now behind us, but consumer spending probably will be somewhere between 5 and 10 pct below the peak records of 1953 when the final results are tabulated.

**Tax Speed-Up Doubtful . . .** Proposed speed-up in payment of cor-

poration income taxes won't go through this year. This looks like the only one of President Eisenhower's 25 tax reforms that is not acceptable to Congress this year.

Tax experts at the Capitol point out that a number of business firms are compelled to borrow money to pay their taxes under the existing schedule of payments. To force incorporated taxpayers to get on a pay-as-you-go basis would impose an unfair and unwarranted burden upon firms already hard-pressed to get up their tax payments.

The Administration has recommended that beginning in the autumn of 1955 a start be made in smoothing out corporation income tax payments by requiring advance payments in September and December before the end of the taxable year. The transition to such a pay-as-you-go basis would be particularly hard on smaller firms.

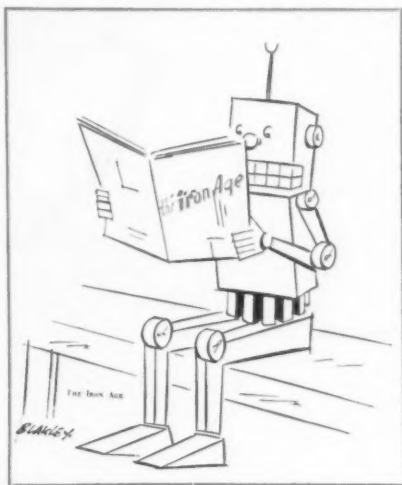
**Boost Jobless Count . . .** A new system of measuring employment which is under test by the U. S. Census Bureau indicates the government may have under-estimated January unemployment by about 728,000.

Under the sampling method in use since 1943, the Census Bureau's earlier report set January jobless at 2,359,000, or 3.8 pct of the labor force. Employment stood at 59.8 million.

Survey by the new method showed unemployment at 3,087,000, or about 4.9 pct of the labor force. However, new procedure showed employment at about the same figure as previously indicated.

Government officials said they were not sure how accurate the latest report was, since the system was new and members of the Census Bureau field staff are not yet completely trained.

**What Ike Thinks . . .** Although the two employment survey methods cover the same number of households, 25,000, the new tech-







## The shape of rings to come

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nique includes a larger area, hitting 230 sections of the country as compared with 68 under the old method. This is the reason for the variation in figures, Commerce Dept. stated.

In commenting on the increased number of jobless indicated in the new survey, President Eisenhower said the new figures did not necessarily mean there had been a sudden rise in unemployment because there were no data for preceding months based on the same sample.

The President stated that it was not known whether the difference in the figures was due to a change in the sampling method or whether there actually had been a sharper rise in unemployment than was expected. His personal view was that both factors might have contributed to the increase shown in the revised figure.

**Stop Uranium Hunt . . .** The Federal Government has given up hope of locating uranium deposits on about 60,000 acres of land which the Atomic Energy Commission had caused to be withdrawn from use.

Since the AEC has been unable to uncover any "significant" finds, the U. S. Interior Dept. will put up for disposal for private use some 37,000 acres in Colorado and 23,000 in Utah.

## Freight Drop on Imported Ore

Interstate Commerce Commission has ruled that imported iron ore moving through Philadelphia to Wheeling, Steubenville, and Youngstown steel mills is entitled to the same rate basis as that moving through the port of Baltimore.

Rates heretofore on the Baltimore basis have been 20¢ a ton below the Philadelphia rate.

Permission to apply the same rate for shipments through ports at New York and Boston was refused.

Figures before the ICC show that imports of iron ore have increased from about 2.5 million tons in 1941 to a current level of about 10 million tons. And this is expected to hit 20 million in a few years.

Under the ruling, the rates from either of the two ports will be \$2.61 to \$2.66 per ton to destinations in the Wheeling and Steubenville areas. Rate to destinations in the Youngstown region will be \$2.71 per ton.

## Atomic Energy:

**See congressional approval of Ike's proposed amendments.**

Congressional action on President Eisenhower's request last week for a law that would put the atom to work for industry is freely predicted in the Capital.

Specifically, the President proposes 13 amendments to the Atomic Energy Act of 1946 to permit improved use of nuclear energy knowledge for both defense and peacetime purposes. The current law, Mr. Eisenhower points out, has been outmoded by national and global developments in recent years.

A principal aim of the recommended amendments is the chance for private business to own and run nuclear power plants, buy or lease atomic fuel from the government,

For article on how small business can use radioisotopes see p. 51—Ed.

and obtain patents, which would not be exclusive initially. Most of these activities would be under Atomic Energy Commission licenses. Congress seems certain to go along with this proposal.

Another important element of the President's plan that will probably get the lawmaker's okay involves sharing with friendly na-

tions of information on tactical uses of atomic weapons and defense against atomic attack. This proposal does not include sharing of U. S. concepts of the strategic employment of A-bombs or H-bombs.

Other suggestions in the law-amending program are the transfer of control of secret A-weapons information from AEC to Defense Dept.; relaxation of personnel security rules regarding unskilled laborers on atomic energy projects; and giving to U. S. allies data on peacetime atomic developments, as well as fuels with which to use these developments.

Congress may balk at this last recommendation unless the Administration shows convincingly that security safeguards will prevent such information from reaching unfriendly nations.

## Navy Inventory Control Pays Off

Careful control of its inventories, the Navy says, is producing actual money-in-hand for the U. S. Treasury.

In the 7 years since an integrated supply system was installed, the seagoing service has used an estimated \$5 billion more in materials than it has bought from civilian sources.

And, says the Navy, it has turned back to the Treasury about \$1.5 billion in cash.

The Navy credits most of these economies to use of the supply system, permitting a better knowledge of inventories and stock coordination. This knowledge led to more efficient employment of materials accumulated in World War II.

Each inventory control point in the Navy system maintains a continuing record of the items it administers. This record shows how much is on hand, where it is stored, how much is needed, and when and where it must be delivered.

The control point also knows which items are fast-moving, which will be needed in case of full mobilization, and which are no longer useful.



# ALLIS-CHALMERS Mercury Arc RECTIFIERS

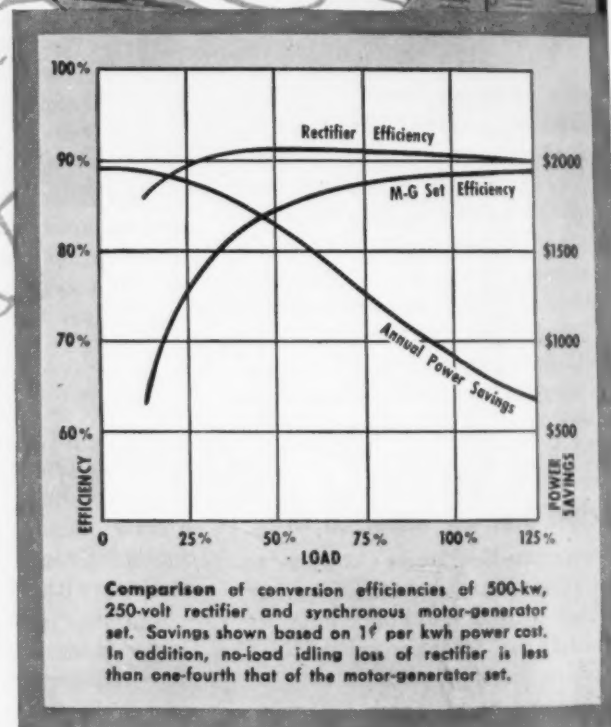


## HERE'S PROOF of Low-Loss Conversion

**TO OBTAIN** economical dc power for arc furnace and blooming mill auxiliaries, West Virginia Steel & Manufacturing Company recently installed mercury arc rectifiers.

The factory-packaged Allis-Chalmers unit includes duplicate 500-kw, 250-volt rectifiers, with tube, breaker, control, and metering compartments, plus dc and ac plant feeder breakers. Since transformers could be installed outdoors, the assembly departs from the usual double-ended arrangement.

Rectifiers were chosen for their high conversion efficiencies *plus* simplified foundation needs, easy installation and minimum maintenance. And Allis-Chalmers units incorporate continuous excitation, grid phase control, internal cooling and enameled anode seals.



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By calling your A-C representative, you can put A-C's quarter century of rectifier application experience to work on your power conversion problems. Allis-Chalmers, Milwaukee 1, Wisconsin.

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# ALLIS-CHALMERS

Our Engineers Introduced Mercury Arc Rectifiers to U. S. Industry





### Nickel Smelting the New Way

**Perrin process will be used in Oregon nickel smelting operation . . . Four 26-ft diam tilting type furnaces will be employed . . . Start production this summer—By T. M. Rohan.**

Four of the world's largest electric smelters go into production this summer in Oregon to squeeze nickel from low grade ore of the sole major deposit in the U. S.

Four 26-ft diam tilting type furnaces will be used in conjunction with the French Perrin process at a mine on the Riddle deposit in southwestern Oregon. Furnaces were designed by the Bechtel Corp. and are being built by Pittsburgh Lectromelt Furnace Corp. for the M. A. Hanna Co.

The process, on which information is skimpy, has been attempted only in France on a pilot plant scale. Two of the Lectromelt furnaces are now being installed for initial operation in May or June with the remainder due later in the year.

**Firm's Biggest . . .** W. B. Wallis, president of Lectromelt, told THE IRON AGE the four furnaces are the largest ever produced by his firm and will be supplemented by two finishing furnaces, a ferro-silicon and a slag furnace. The larger units are equivalent to 200-ton steel furnaces in size and have 55-in. electrodes, largest ever used. Biggest previous tilting type furnace built by Lectromelt was 15-ft in diam.

The four new furnaces will operate at 15,000 kva on relatively low voltage due to low nickel content.

Content of the ores is about 2.5 pct nickel oxide. Not homogeneous, it will be blended to relatively uniform composition.

The ore originally has 20 pct free moisture and 7 pct combined water. It will be put through dryers and a 9 x 275-ft calciner operating at about 1300°F. From there

it will be transferred to storage bins and then to the smelting furnaces operating at 2700-2900°F.

**Mixed Like Bromo . . .** Molten ore will be transferred to ladles and ferrosilicon from a separate furnace will be added. To reduce molten nickel to ferronickel requires a violent agitation so the metal will be poured back and forth from one ladle to another in a special tilting rig. About 11 tons of molten ore will be produced per hour.

Slag will be continually poured off and additional molten metal added to fill the ladles. Output will then go to a superheating furnace where temperature will be raised to 3000°F and then to a de-phosphorizing furnace. End product will be 75 pct iron and 25 pct nickel pigs.

**From French Patents . . .** The plant was worked out from very sparse preliminary data from French patentholders. Their sole operation was the pilot plant intended mainly for production of ferrochrome.

Because of huge expense of

strip mining, ore preparation and the blending plant, the U. S. guarantees purchase of a percentage of the output at a fixed price similar to other mining operations on low grade copper deposits in the West.

**Lone Star Rising . . .** Lone Star Steel Co. at Daingerfield, Tex., which recently completed an \$87 million expansion, expects to hit full production of 30,000 tons of welded pipe about mid-year.

First heat was tapped in June in the new mill built around a 1942 government-erected blast furnace. January output hit 20,000 tons. Three of four openhearth are now in operation on 21 turns.

**Have Freight Umbrella . . .** Bulk of output is put through a Yoder mill, one of the largest built and almost completely automatic in operation. Marketing area is through oil well supply distributors serving the heavy production areas of Oklahoma, East Texas and Louisiana under a comfortable freight umbrella from competitors in Colorado, Chicago and some in California.

Demand continues steady for distribution lines, collecting systems and some casing in the East Texas field, with Lone Star supplying up to a quarter of the market. Output was on allocation until last month.

Local Texas ores from a radius of 15-20 mi. are used in the 1000-ton blast furnace currently turning out 1200 tons per day. Ores run about 15.25 pct iron content raw but are beneficiated to 50 pct. Coal haul from Oklahoma is about 250 mi.

**Air Conditioning Spurt . . .** On a western junket to push air conditioning sales, Carl E. Bucholzer, Chrysler Corp. Airtemp Div. president, said last week 1954 sales will double '53's \$89 million which in turn were twice the 1952 sales figures.

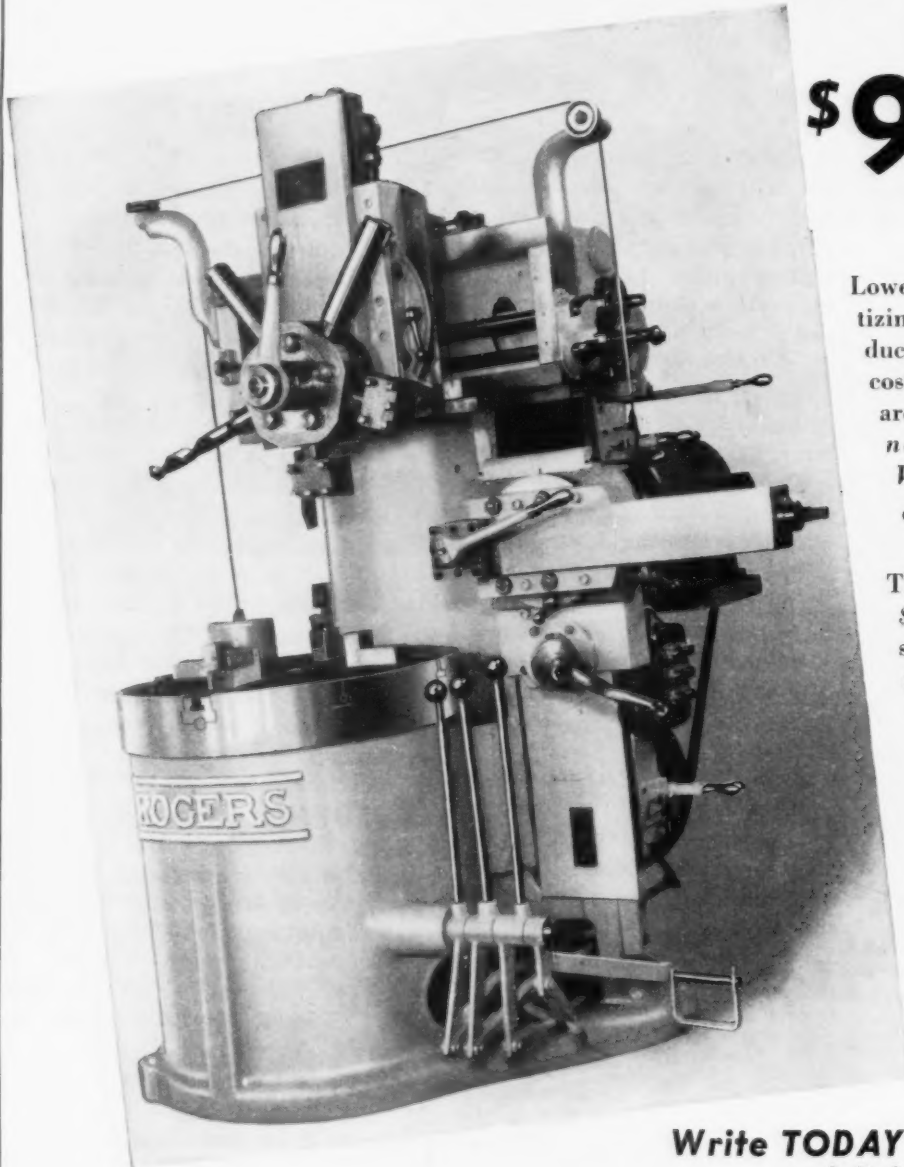


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# Machine Tool High Spots

## Industry Continues in Comeback Role

**New machine tool order index climbs for second consecutive month . . . Shipments rise too . . . Industry business in '53 estimated at \$862 million—By E. J. Egan, Jr.**

New orders for machine tools rose again in January, extending the uptrend which started in December. This confirmation of a predicted turn for the better is encouraging to U. S. builders who have watched their order books getting slimmer ever since production for Korea eased off.

Preliminary figures from National Machine Tool Builders' Assn. peg the January new order index at 172, up by about 22 points from December's 149.8.

December new orders totaled slightly more than \$44 million. Estimate for January is about \$51 million. Total 1953 new business for the industry came to \$862 million. Bulk of these orders were from U. S. customers; only 7.6 pct from foreign sources.

**Shipments Up Too . . .** Machine tool shipments for January are also up according to NMTBA preliminary figures. January shipment index is at 317, compared with December's 301.4.

Dollarwise, machine tool shipments still appear to reflect defense orders placed early in 1953. In December they totaled \$89 million and are expected to hit about \$94 million when final January results are in. Shipments for all of 1953 came to \$1.19 billion.

**'54 Looks Good . . .** Distributors and manufacturers selling to the industrial market are optimistic about the 1954 business outlook. At a recent joint meeting of the Southern Industrial Distributors' Assn. and the American Supply and Machinery Manufacturers' Assn. in Biloxi, Miss., members were polled to get a forecast.

First question asked distribu-

tors how they expect business in the first six months of 1954 to compare with 1953's first half. Out of 49 answers, 15 expect a first half improvement averaging 9 pct above 1953; 22 look for business to be about the same as last year; 12 expected a drop in business averaging about 9.75 pct.

Manufacturers were asked the same question, gave a slightly more conservative overall answer. Of 76 questionnaires returned by this group, 23 expected business volume to increase 10.5 pct over the first six months of 1953; 29 estimated volume would be about the same as last year; 24 look for a drop, averaging 9.33 pct.

On prospects for the last 6 months of this year, distributors and manufacturers alike were even more optimistic. Distributor predictions lined up this way: 17 believe business volume will be up an estimated 9 pct over 1953; 19 guess it will be about the same; 12 look for a 6.9 pct volume drop.

**About Even . . .** Of the 75 manufacturers willing to gage prospects for the last half of 1954, 27 expect

an increase of about 12.3 pct over last year; 26 expect the two periods to match evenly; 22 think volume will drop 9.3 pct.

The Cincinnati Milling Machine Co. has formed a Machine Tool Division, accompanied by several shifts and promotions in top level personnel. Swan E. Bergstrom, vice president and director of Cincinnati Milling, will head the new division as manager. He will be assisted by L. F. Menninger.

A special machine tool section will operate within the new division with Carl Stugard, former manager of the firm's Chicago office, as head.

Other broad divisions of the company's setup are: Machinery (Hydroform, Flamatic, contract equipment), and Products (including grinding wheels and Cimcool cutting fluids). Manager of the Machinery Div. is E. D. Vancil, formerly manager of engineering.

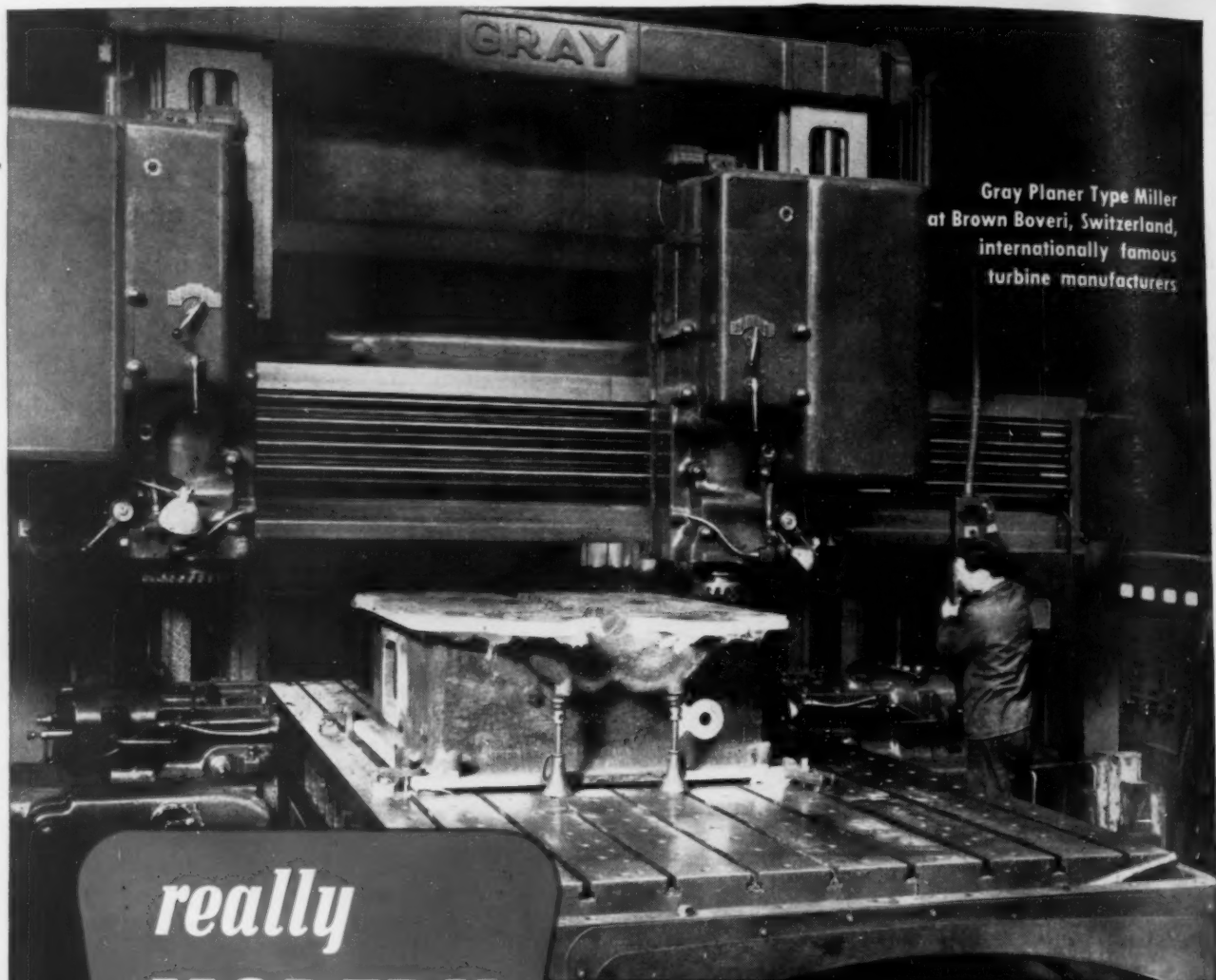
**MIT Offers Course . . .** A special summer program of interest to machine tool builders and users will be offered at Massachusetts Institute of Technology, Cambridge, Mass., from June 15 through June 25. Course will cover a number of fundamental topics concerning design, use and evaluation of machine tools.

MIT staff members and outside specialists will give lectures and demonstrations on machine tool control systems, alignment problems and vibration. A session will be devoted to automatically controlled machine tools and the automatic factory. Entire course will be directed by Dr. Milton C. Shaw, Professor of Mechanical Engineering.

Machine tool builders seeking new business might find it profitable to visit Japan. Word from a leading export firm indicates Japanese manufacturers prefer American metalworking equipment to that of European make, might react favorably to a little doorbell ringing by U. S. builders.







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# REPORT TO MANAGEMENT ..

Some workers  
are missing

How's business? A bit worse than expected. That's the news the nation received from Washington last week. Sources:

(1) Dept. of Commerce which said its new survey method showed unemployment early in January was nearer 3.1 million than its previous estimate of 2.4 million.

(2) Statements by a Federal Reserve Board official that: The 10 pct drop in the board's industrial production index equaled the decline of the '48-'49 recession; that the business dip has been more severe than was realized when the President's Economic Report to Congress was compiled.

Tears on a  
typewriter

Chances are these announcements will have a more depressing effect on trade press editors than they will on industry and business. Forecasters can be expected to pound the recession keys a little harder while business and government maintain their watchful optimism a little longer anyway.

Most government economists have circled late March, early April as showdown time. They expect to know then whether they snake-eyed or made point on their roll that the current slump is largely an inventory adjustment that will correct itself.

And if Ike's  
wrong ...

But what if this gamble misses? Then you can expect the Administration to make a fast switch from its "business makes jobs" economic policy to one more in line with the Truman-Roosevelt plan of tickle the consumer till he spends.

If this change in policy is made watch for some of these developments: (1) easing, perhaps end of excise taxes, (2) expanded public works programs, (3) higher social security unemployment benefits, (4) easier credit, (5) greater personal income tax exemptions, (6) possible increase in the national debt.

First indication there might be a shift in government thinking came last week. Confronted by the new unemployment figures, Mr. Eisenhower stated guardedly that if there wasn't a pick up in employment in March there was a possibility some sort of tax relief would be put through to stimulate consumer spending.

Will it be time  
for a change?

If this weren't an election year, the current Eisenhower policy of "what's good for business is good for the country" might be given a longer shakedown. But Republicans fear that, if the "rolling readjustment" is still freewheeling when poll-time comes, a lot of them will be moving out of their D.C. apartments.

Love and a  
beer can

Beer can manufacturers owe young love a toast. Used to be (1934) 75 pct of beer sales were from the tap, now 77 pct are canned, bottled. One ad exec says the change is because there are more marriages in the 20-24-year-old age group. In 1940 only 27 pct of this age category was married, now it's around 48 pct. Seems the young ones like their beer, TV at home.

February 25, 1954



## More Features of **EC&M TYPE SW ALL-WELDED** **LIFTING MAGNETS** Assure More Dollar Value



EC&M Type SW ALL-WELDED Lifting Magnets have a new look . . . inside as well as outside. Stronger, better designed to withstand the hard knocks encountered in magnet operation, they are easier to maneuver, and through high lifting capacity they reduce handling costs.

The magnet-coil is wound between turns with purer, thinner asbestos tape, with its strength increased by impregnation with EC&M No. 281 compound. Between layers, the insulation is a new product—ECAMICA board which is moisture-free, has high dielectric strength and excellent mechanical ability. A new fabricating process locks the windings against movement.



Look at the features pictured here in the top and bottom views of the magnet. Remember, too, that these EC&M magnets are ALL-WELDED to keep pole shoes tight—to keep moisture out—to increase the efficiency of the magnetic circuit and to prolong magnet life.

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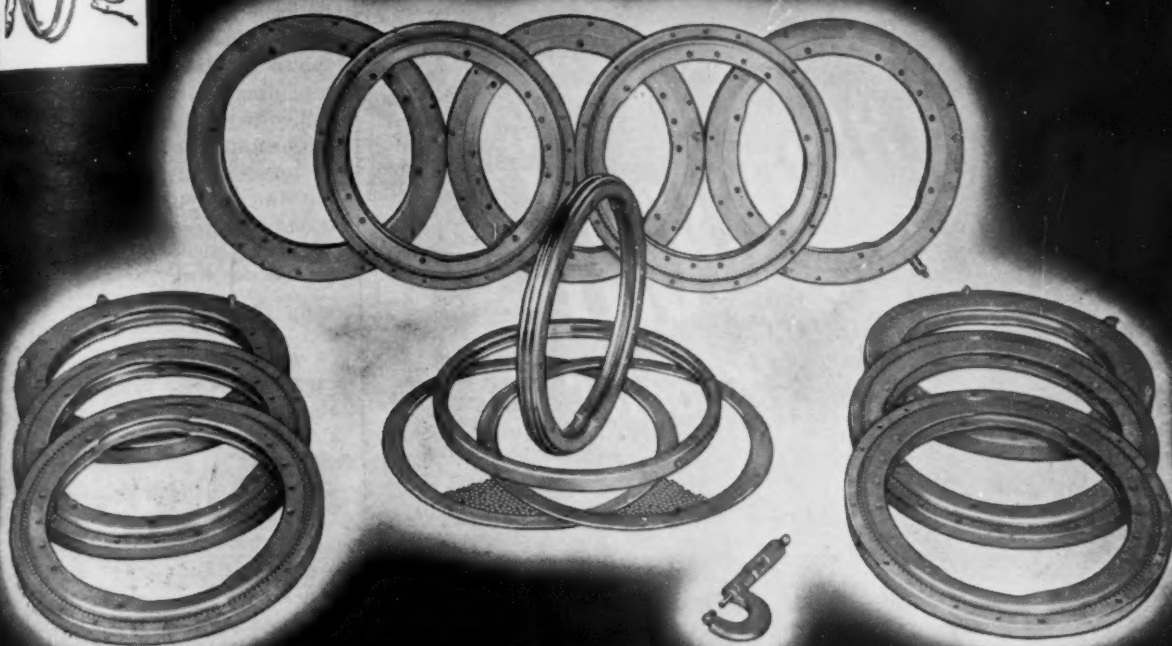






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We have manufactured precision gears to customers' specifications for over thirty years. This collective experience enables us to approach any gear engineering problem with a vast amount of "hindsight." For no matter how exacting your particular requirements may be, they cannot exceed those of many of our regular customers. The return of a buyer's market places a premium on quality. And if — in the product you manufacture, quality is synonymous with trouble-free power transmission — our gear engineering service will be of great value to you right now. Ask us for suggestions, ideas and cost estimates today.

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**NOTE 1:** A new product is the Perkins Precision Spring Coller. This collar (patent applied for) turns out precision springs—any type, shape, size, from wire sizes .005 to .125.

**2:** Another new product—the Perkins "Bendit 15"—a patented metal forming machine bands and shapes sheets, rods, strips tubing into innumerable complex as well as simple forms that would be difficult or impossible to make by other means. Eliminates need for expensive tools or specialized skills. Ht. 47", net wt. 200 lbs. Write today for descriptive catalogs, prices etc.

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## Free Publications

Continued

### Roofing

*How to Estimate Cost of Material and Labor for Follansbee Terne Metal Roofs* is the title of a work-piece type bulletin just prepared by Follansbee Steel Corp. Complete data and work tables for determining roof areas by measurement or calculation are contained in the bulletin. It also includes an accurate method for figuring rolls of terne metal for a specific roofing job and a sound formula for calculating a price quotation. *Follansbee Steel Corp.*

For free copy circle No. 16 on postcard, p. 13

### Steel

In a folder now available to steel users, Carpenter compares the workability and mechanical properties of Type 443 steel at room and elevated temperatures with those of Types 304 and 430. The principal advantages of Type 443 stainless are listed as: excellent corrosion resistance, high resistance to scaling conditions, low annealing temperature, good workability and machinability similar to that of SAE 3145, 3250 and 4650. *Carpenter Steel Co.*

For free copy circle No. 17 on postcard, p. 13

### Wall construction

*Triangle Topics* is published to pass on helpful design and application data about refractory materials and construction to operating men in all industries. Latest issue gives case histories where Laclede Wall construction and refractories were used. *Laclede-Christy Co.*

For free copy circle No. 18 on postcard, p. 13

### Packaging

Spectacular shipping box savings and solutions for unusual packaging problems are featured in *Package Laboratory News*. Factual articles show how particular packaging problems were solved and details concerning specific savings in time, labor, material and freight costs are outlined. Other valuable information, plus a free packaging reference book, is offered. *Hinde & Dauch.*

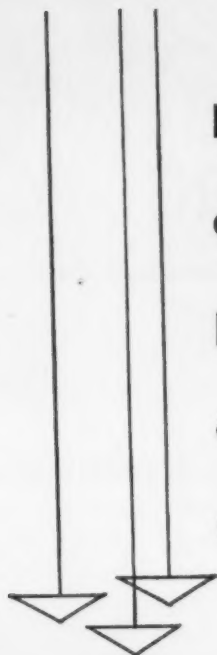
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### Created-metals

New comprehensive presentation by Carboly shows the influence and impact of created-metals on America's manufacturing life. Pamphlet also pictures the role of existing created-metals and those still in laboratory development. *Carboly, Dept. of General Electric.*

For free copy circle No. 20 on postcard, p. 13

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prove the efficiency  
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# GRAINAL ALLOYS

Vancoram GRAINAL Alloys have been used to produce millions of tons of boron steels—and demand for these multiple element alloys is still growing. Here's why . . .

GRAINAL Alloys have proved invaluable in defense production, and are equally important in the making of steels for peacetime uses. They replace costly elements with respect to hardenability and other properties. They accomplish this through tailor-made composition that removes the element of chance from the steelmaking process. That's why the vast majority of all boron steels made today are made with GRAINAL Alloys.

Second, in stainless steels, small additions of GRAINAL Alloys improve hot working

characteristics, cut conditioning costs, increase output—pointing the way to another major GRAINAL application.

As part of its long-range program for keeping in step with America's expanding metals industries, Vanadium Corporation has installed at its new plant at Cambridge, Ohio, additional facilities for the production of GRAINAL Alloys.

For complete information on GRAINAL Alloys and other Vancoram products, contact your nearest Vanadium Corporation representative.

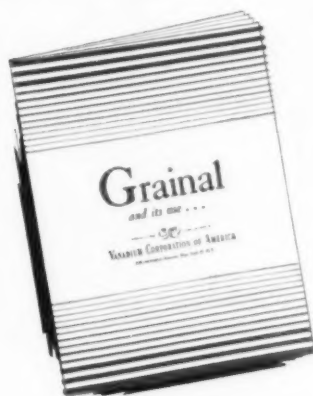


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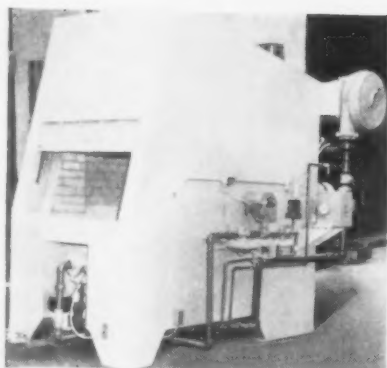
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February 25, 1954



# NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies . . . just fill in and mail the postcard on page 83 or 84.



## Modernized recirculating furnace has fan built in

With fan built into the furnace, this convection recirculating forced draw furnace recirculates the hot gases through the work chamber at the rate of 70 complete air changes per minute. The door is air operated. Sloping front design assures tight seal around the door frame; predetermined temperatures are maintained right up to the door without any cool area. Tempera-

ture range is from 250° to 1250°F. Other furnaces of this type are available for operation to 1650°F in a range of sizes, with manual, air, hydraulic or electrically operated doors and either gas fired or electrically heated. All piping is color-coded and furnace may be shipped as a package unit. *Bellevue Industrial Furnace Co.*

For more data circle No. 21 on postcard, p. 8

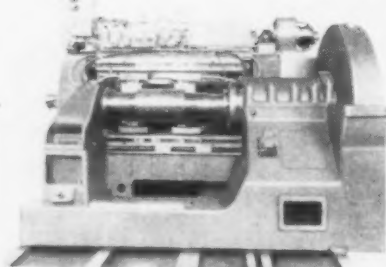


## Visual unit for testing special atmospheres

Both research and production departments of any plant using special atmospheres or heat treating furnaces will find use for the new portable, visual unit for testing gases. With this unit the operator can determine, quickly and easily, the quality of gas being produced by a special atmosphere generator,

also the quality of the atmosphere in special atmosphere heat processing furnaces. The carbon potential of an atmosphere is determined by holding the specimen at temperature in the atmosphere for the desired length of time and then cooling. *Electric Furnace Co.*

For more data circle No. 22 on postcard, p. 8

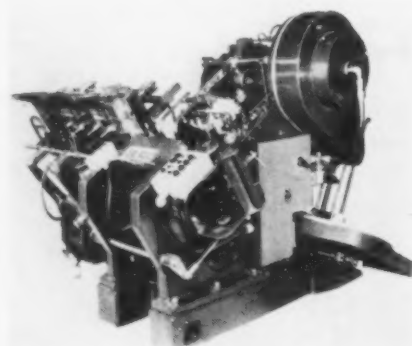


## Twin-head gear generator reduces cutting time

The redesigned Farrel-Sykes gear generator provides finer precision at higher operating speeds. The new machine cuts gears up to 33 1/3 pct faster, with higher accuracy and quality of tooth finish. Greater operating convenience has been built into the machine, including rapid selection of speeds and

feeds, easy adjustment of cutters, easy and positive control of infeed or depth of cut. In addition to continuous-tooth herringbone gears, the twin-head machine will cut double helical gears, single helical and straight tooth gears. *Farrel-Birmingham Co., Inc.*

For more data circle No. 23 on postcard, p. 8



## Strip feed press operates at 300 spm

Completely-new automatic strip feed press that is used to produce sanitary can ends and closures was designed from the ground up for high-speed operation. In long test runs it has operated satisfactorily at speeds beyond 300 strokes per minute. Following features facilitate continuous operation at high speed and minimize vibration and maintenance: Combination

disk friction clutch and brake, electrically controlled, permits instant starting; balanced crankshaft minimizes vibration; bolster area has been increased; press timing is arranged for slide to stop automatically at top of stroke. Machine accommodates can ends from 202 to 404 sizes. *E. W. Bliss Co.*

For more data circle No. 24 on postcard, p. 8

Turn Page

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# WEIRTON

## High-Carbon Strip Cold-Rolled Spring Steel

The requirements of high-speed cold forming or blanking are met consistently by Weirton cold-rolled spring steel. Formulated to exact specifications for each job, it makes the operation easy and economical for products in which high fatigue resistance is essential.

To an unusual degree, Weirton high-carbon strip cold-rolled spring steel possesses these highly important characteristics:

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It is supplied with the desired chemical composition and for specific heat treating and hardness ranges in strips up to seven inches wide.



**SPHEROIDIZED—**  
Annealed, soft and ductile.  
Ideal for cold forming  
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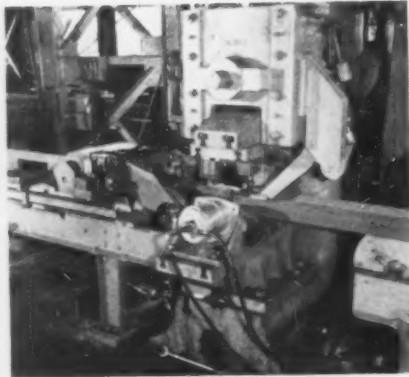
**NATIONAL STEEL CORPORATION**



**PEARLITIC—**  
Temper-rolled in  
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## New Equipment

Continued

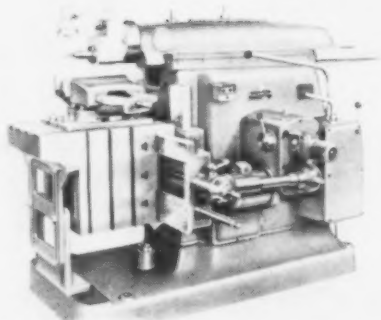


### Spacing machine for punching holes in beams

Template making, lay-out or marking of iron is eliminated when punching holes in structural beams, channels, angles, plates, etc., with this automatic spacing machine. Operation is extremely simple. Stop pins are set to the desired hole spacing on the steel, graduated spacing bars. No tape line is required. The beam is rolled into the air-operated gripper jaw and

with a flip of a lever the beam is instantly gripped. A throw of a valve lever and the carriage advances to the first set stop pin. Holes are punched and the automatic carriage advances to the next stop pin, etc., until the end of beam is reached. Holes can be punched on the return travel if stop pins are set. *Pollasky Engineering Co.*

For more data circle No. 25 on postcard, p. 53

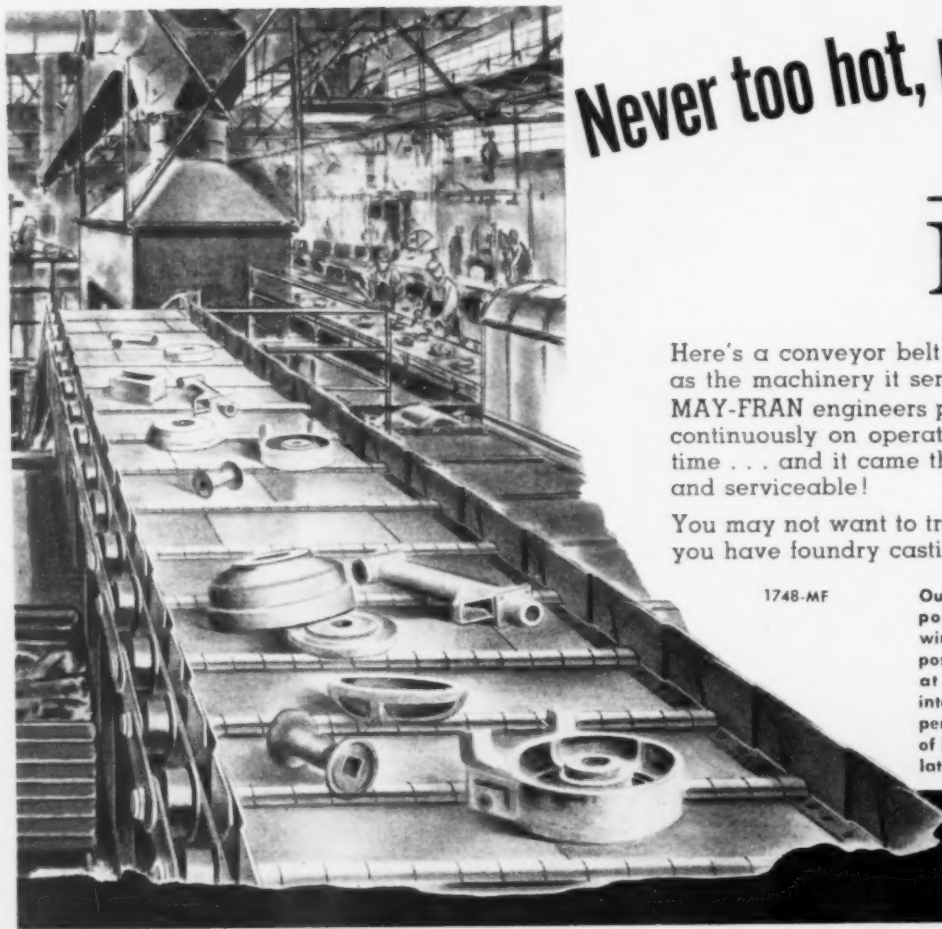


### Shapers for utility and heavy duty operations

Plain and universal shapers, manufactured in Sweden by Varnamo Maskinaktiebolag, are available in two series: Type E utility shapers and Type ES heavy duty production shapers. Utility shapers, with 14, 18 or 22 in. stroke provide a selection of six ram speeds and four power table feeds through conveniently located hand levers. Heavy production shapers are available

with 18, 22 or 26-in. stroke and plain or universal tables. They provide 8 ram speeds and 10 table feeds through a completely enclosed feed mechanism. Centralized lubrication system insures adequate lubrication of all moving parts. Both series are equipped with hardened and shaved gears and anti-friction bearings. *Austin Industrial Corp.*

For more data circle No. 26 on postcard, p. 53



# Never too hot, never too heavy,

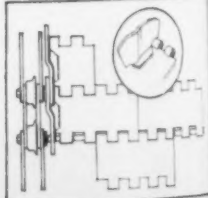
## MAY-FRAN

Here's a conveyor belt built to take it . . . to last as long as the machinery it serves! Once installed, it's in to stay. MAY-FRAN engineers poured abrasive carborundum dust continuously on operating belt for a prolonged period of time . . . and it came through this grueling test still intact and serviceable!

You may not want to transport carborundum dust — but if you have foundry castings . . . die castings . . . hot forged

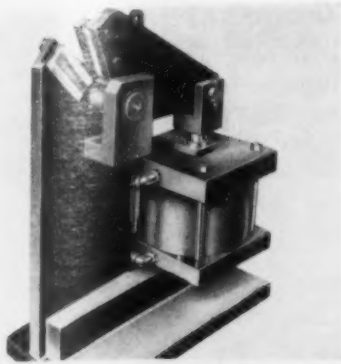
1748-MF

Outside links incorporate interlocking wings . . . remain positively engaged at all times. New interlocking flanges permit staggering of links . . . eliminate lateral movement.



## MAY-FRAN



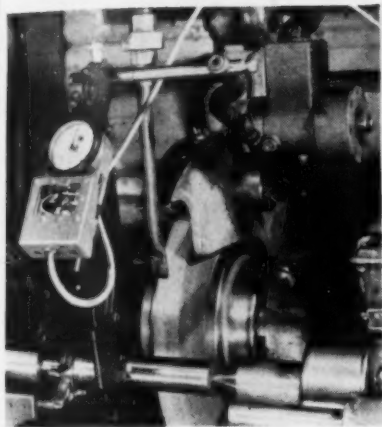


## Air-operated shear crops hot metal bars

New portable air shear for cropping hot bars—ferrous and nonferrous—in merchant and bar mill operations is rated with a capacity to crop up to 1¼ in. diam hot rounds at air pressure between 60 and 100 psi. The shear weighs less than 1500 lb and requires floor space of 16 x 33 in. Practically no maintenance is required as far as

lubrication or replacement of parts are concerned. The Type B shear features four-edged knives as standard equipment, with set screws provided for adjustment after grinding. Operation is automatic only at time of actual cutting; running between cuts is eliminated. *Curry Air Shear Corp.*

For more data circle No. 27 on postcard, p. 83



## Automatic size control for cylindrical grinders

Elimination of scrap and rework is a money saving feature of the new Federal electric grinding gage. Because the grinder is controlled by the Electricator, every piece can be ground to proper size. This gage is made up of the Arnold grinding gage frame and caliper with a Federal Electricator, plus a power or control unit. With it, the operator needn't stop grinding to gage the work for size. Automatic control of the grinder begins

as soon as the gage is snapped on the work and the gage can be placed on the work before the work cycle is started, while the wheel is coming forward, or while the work is being ground. The gage rides the work during the grinding and through its power unit controls the wheelhead feeding mechanism. Accuracies of 0.00005 in. are reported. *Federal Products Corp.*

For more data circle No. 28 on postcard, p. 83

Turn page

heavy, never too abrasive for...

## MAY-FRAN HINGED-STEEL BELTING

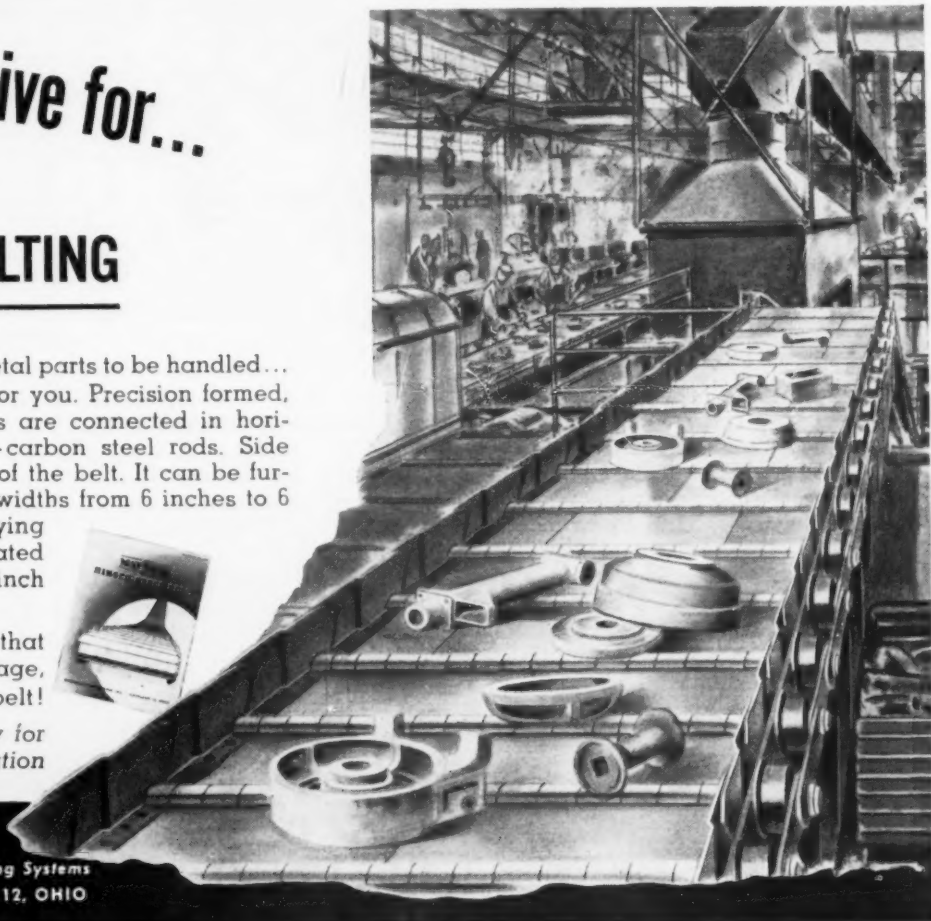
items...hot, heavy or abrasive metal parts to be handled... MAY-FRAN hinged-steel belt is for you. Precision formed, heavy-gauge hinged-steel links are connected in horizontal rows by means of high-carbon steel rods. Side chains become an integral part of the belt. It can be furnished to your specifications in widths from 6 inches to 6 feet and in any length or carrying capacity. Both solid and perforated links are available in 2½ to 12-inch pitch lengths.

If you want conveyor belting that can withstand the roughest usage, specify MAY-FRAN hinged-steel belt!

Write today for complete information

**ENGINEERING, INC.**

Designers and Builders of Complete Handling Systems  
1698 CLARKSTONE ROAD • CLEVELAND 12, OHIO



**NEW**

# DOOR CATALOG

**IDEAS**

**FULL OF FACTS**

**HANDY**

**HELPFUL**

You'll have full information on cost-cutting doors for every need in this new 1954 Kinnear catalog.

It gives you full, up-to-the-minute information on how to save maximum space, cut costs, boost efficiency and get more protection at doorways in old or new buildings. In addition to complete data on Kinnear Steel Rolling Doors—the doors with the famous, *Kinnear-originated* curtain of interlocking steel slats—it tells all about Kinnear Steel Rolling Fire Doors, sectional-type Kinnear ROL-TOP Doors, and the protective Kinnear Steel Rolling Grilles. Write for your FREE copy TODAY!

**SAVING WAYS IN DOORWAYS**

**KINNEAR**  
ROLLING DOORS

**The KINNEAR**  
Manufacturing Company

**FACTORIES:** { 1760-80 Fields Ave., Columbus 16, Ohio  
1742 Yosemite Ave., San Francisco 24, Calif.

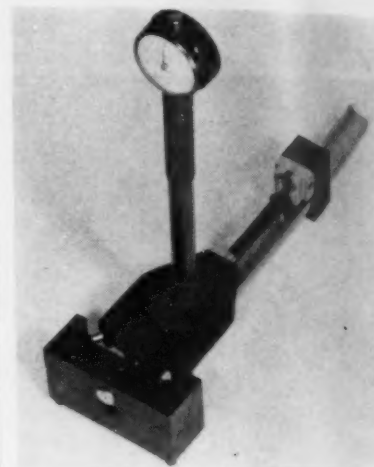
Offices and Agents in Principal Cities

## New Equipment

Continued

### Gage setting master

Dial bore gage Setmaster is adjustable for setting to a given dimension with gage blocks. It is locked and sealed and then used on the job as the setting master for the Boice dial bore gage. Its rigid functional design provides for the easy insertion and removal of the

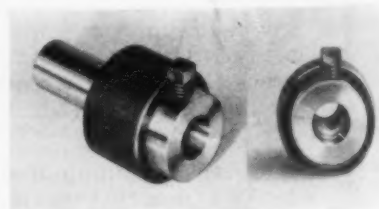


gage blocks. The built-in equalizer positions the gage so that it is necessary to rock it only in one plane to establish the zero reading on the indicator. The set master can be set and re-set as the demands of short run production are met. *Boice Mfg. Co., Inc.*

For more data circle No. 29 on postcard, p. 83

### Through-hole design

The Amcam Tap-Holder is designed with the center hole running all the way through. This feature makes it possible to insert a full length tap without grinding off

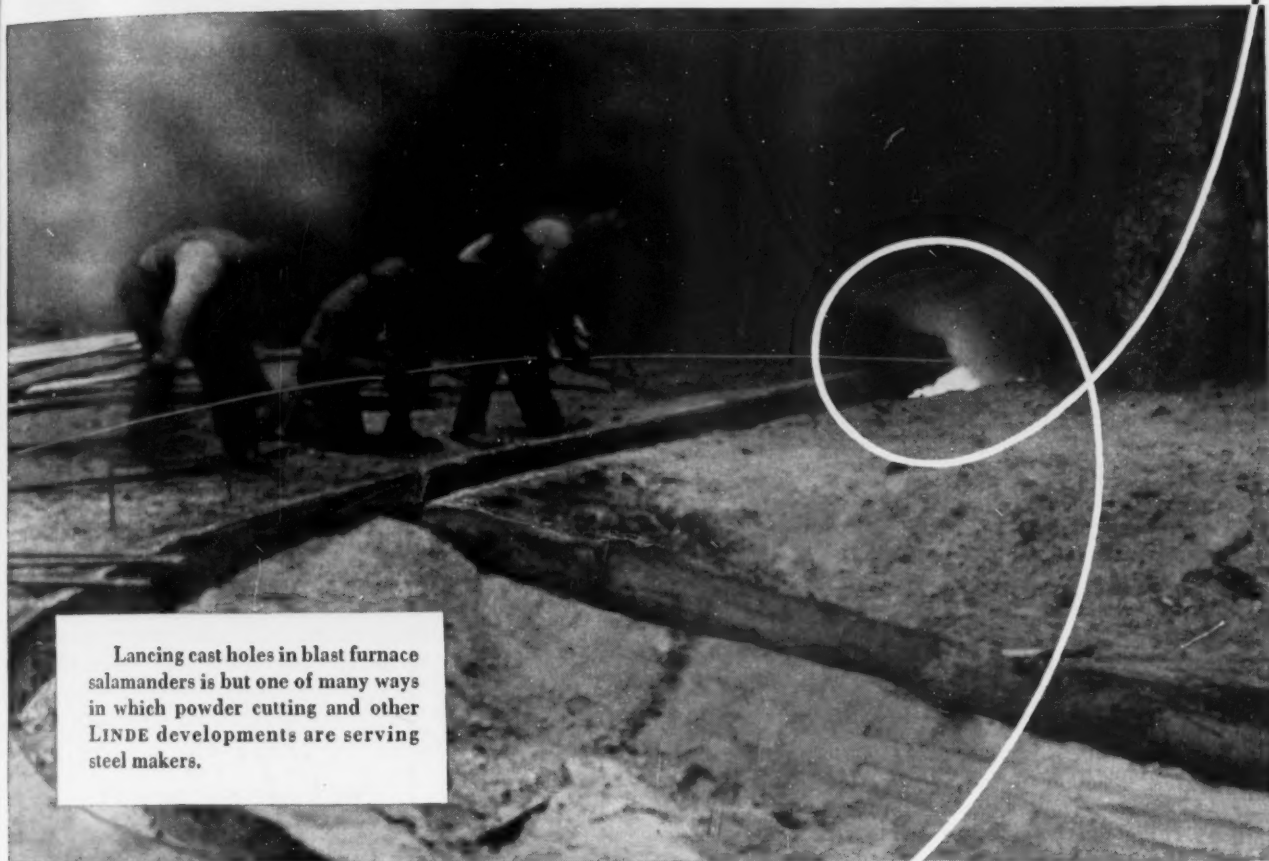


part of the shank in order to seat the tool in a blind hole. Broken taps can be extricated without removing the holder bushing or disassembling the holder from the machine. *American Cam Co.*

For more data circle No. 30 on postcard, p. 83

Turn Page

# How Oxygen ...and LINDE SERVICE\* GOT A STEEL MILL "OUT OF THE WOODS"



Lancing cast holes in blast furnace salamanders is but one of many ways in which powder cutting and other LINDE developments are serving steel makers.

Costly downtime was piling up in a large steel mill. Usual methods of tapping a blast furnace salamander wouldn't work. It looked like the furnace would be down for some time.

Then LINDE SERVICE was called in. Powder cutting for lancing a cast hole in the furnace was recommended. LINDE-trained operators began powder cutting at 1 a.m. Five hours later, the 225-ton salamander was out of the furnace.

"Thank you for your help during our recent blast furnace difficulties," a mill official wrote. "We are now out of the woods, thanks to the help of your operators and the powder lance."

Today, the LINDE powder lance is standard equipment in that mill.

## \*LINDE SERVICE

is the unique combination of research, engineering, and more than 40 years of accumulated know-how that is helping LINDE customers save money and improve production in their uses of oxygen and oxy-acetylene processes.

*If your company uses oxygen, LINDE SERVICE can mean dollar savings to you. Let us tell you more about it.*

### LINDE AIR PRODUCTS COMPANY

A Division of UNION CARBIDE AND CARBON CORPORATION

30 East 42nd Street  New York 17, N. Y.

Offices in Principal Cities

In Canada: Dominion Oxygen Company

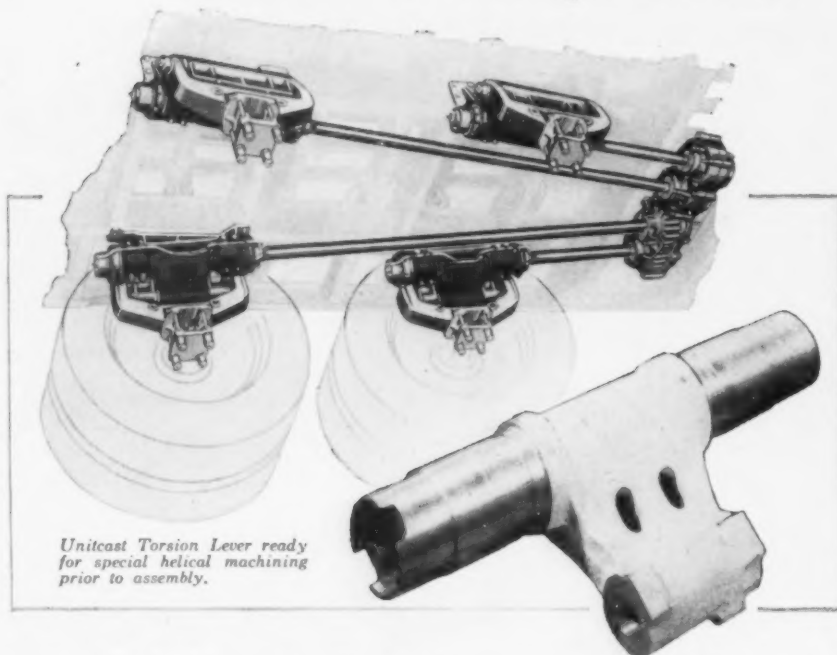
Division of Union Carbide Canada Limited



February 25, 1954



# Unitcastings solve tough torsion lever problem!



Unitcast Torsion Lever ready for special helical machining prior to assembly.

**..good foundry technique = good castings!**

With a primary objective of producing matched pairs . . . and producing them right, this Torsion Lever proved a healthy challenge to foundry engineering. End use of this main link between the torsion springs and the axles requires finished castings that are sound, accurate and physically dependable.

Unitcast solved the problem by perfecting a molding procedure especially for this particular job. Individually controlled and synchronized operations produce steel castings "constantly high in quality". As to cost factors . . . delivered, the castings require *no preliminary machining* . . . and one important fit surface is held within tolerances that require *no finish machining at all!* Accepted production to date . . . over 350,000 units, is high recommendation of Unitcast's foundry technique!

Are you missing "constantly high quality"? Let Unitcast analyze your parts problems . . . there's no obligation. And, all inquiries we receive for new designs are kept in strictest confidence.

UNITCAST CORPORATION • Toledo 9, Ohio

In Canada: CANADIAN-UNITCAST STEEL, LTD., Sherbrooke, Quebec

# Unitcast



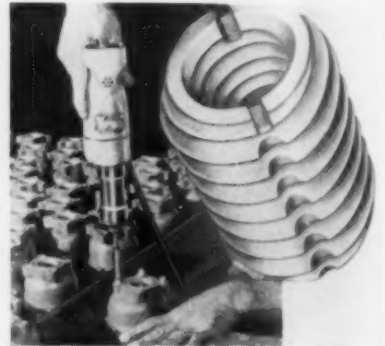
**QUALITY  
STEEL  
CASTINGS**

## —New Equipment—

Continued

### Threaded insert

New screw-in, steel WEG insert provides a permanent thread anchor for bolting metal to metal, wood and plastic. It consists of only one part and is safely and quickly locked in position with pins.



New WEGs are slotted for screw-driver installation, in sizes to 1/4 in., resulting in a reduction of installation time reported to be 50 pct. Larger sizes are installed with a simple insert driver. Roylyn, Inc. For more data circle No. 31 on postcard, p. 83

### Recovery magnet

A powerful little 4 1/2-in. magnet is used as a recovery tool for anybody who works with metal. It will attract and hold lost tools, parts or spilled pieces of metal from inaccessible places. The magnet is the



permanent type—no electric current, wires, batteries, etc. It is a pocket-sized self-contained instrument made of powerful Alnico V and is contained in a 1-in. non-magnet stainless steel tube. Eriez Mfg. Co.

For more data circle No. 32 on postcard, p. 83  
**Turn Page**

# Great Motors from Great Britain!

*the facts behind a high-quality, world-famous line of motors now available in America (N.E.M.A. standards) at savings up to 40%*



## DESIGN FEATURES

**Totally Enclosed Fan Cooled Type** keeps out dust, moisture, oil and abrasive grit.

**Open Drip-Proof Type** provides adequate protection from falling liquids. Windings are insulated with high-quality materials and finally dipped in thermo-setting varnish and baked to give mechanical strength and high resistance to the entry of moisture and oil. Bearings of standard sizes are fitted and are of ample size to give long life under all drive conditions. Shaft is designed to withstand overloads and shock loads.

## with these additional features

- immediate delivery from stock
- any motor sent free for examination and testing
- unconditionally guaranteed
- superior design
- all types and sizes up to 230 H.P.
- offices in principal cities

The first fact is that motors are our business, our only business. Since 1935 we've sold more than two million motors in 62 countries. And we're making and selling a larger volume than ever right now. NEWMAN MOTORS have a world-wide reputation.

Another fact is that economics favor us because we can produce higher-quality motors at relatively lower costs than American manufacturers. And because we are now enjoying a further cost margin from our high production we are offering the lowest prices to the American buyers.

These are high-quality, unconditionally-guaranteed motors in a complete range of totally enclosed fan cooled and open drip-proof designs (squirrel cage and wound rotor) in all sizes up to 230 h.p. Write today, via coupon below, for catalog and price lists.

# Newman

**NEWMAN INDUSTRIES (AMERICA) INC.**

**43 BROAD STREET**

**NEW YORK 4, NEW YORK**

## Newman Industries (America) Inc.

43 Broad Street, New York 4, New York

Please send me a catalog and price list of the full line of NEWMAN MOTORS now available in the United States at savings up to 40%.

Attention of \_\_\_\_\_

Company Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_



# You Sell It!

## We'll Design It

Some typical designs assisted to perfection by Taft-Peirce engineers — a silent typewriter, an automobile engine, automatic lens grinders, hat-making machines, watch-part profiling machines, countless machine tools and smaller mechanisms.

## Tool It

Several large corporations rely exclusively on the Taft-Peirce Toolroom for tool design and manufacture.

## Make It

1500 Machine tools . . . 450,000 square feet of plant — provide the facilities for anything from a single simple part to thousands of complex mechanisms.

## Test It

A separate production line may be set up in sequence operation — from design through assembly, test, and final inspection.

## Ship It

Taft-Peirce offers you all or any part of these services. Have the full facts at your fingertips — write for the 92 page illustrated booklet, "Take It To Taft-Peirce."



*For Engineering, Tooling, Contract Manufacturing*

**TAKE IT TO TAFT-PEIRCE**

The Taft-Peirce Manufacturing Company, Woonsocket, R.I.

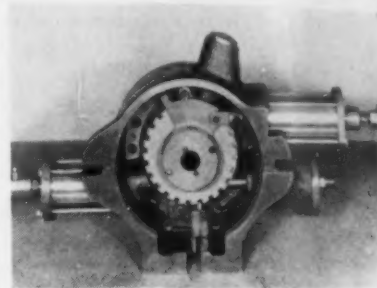
TELEPHONE: WOONSOCKET 1

## New Equipment

*Continued*

### Speed indexers

An integral shock control unit is a new design feature on Erickson speed indexers. This built-in protective device is adjustable to meet requirements of varying loads. It is said to assure constant, uniform feed while allowing maximum



speeds without danger of damage to the mechanism or work. Indexers may be operated by air or hydraulics and used in either vertical or horizontal position. Standard 24 position index plate allows an indexing range of 4, 6, 8, 12 and 24 positions. *Erickson Tool Co.*

For more data circle No. 33 on postcard, p. 83

### Lubricating system

An improved version of the Atom-Lube lubricating and coolant system has a 12 in. nozzle of flexible tubing provided with two interchangeable inner tubes. One, of copper, is used where the nozzle is seldom readjusted; the other, of flexible plastic, is recommended



where the position of the nozzle must be adjusted frequently. The system uses a powerful air jet to atomize any desired cooling or lubricating liquid from water to heavy machine oils. It is said to have been successfully applied to machining and grinding operations.

*Henry G. Thompson & Son Co.*

For more data circle No. 34 on postcard, p. 83

Turn to Page 100





**MIXES BETTER IN HOT WATER.** New S.E.C.O. mixes and remains stable even at 180 F. This permits its use in washing and rustproofing.



**MIXES EASILY IN COLD WATER.** New S.E.C.O. forms stable emulsions in the coldest water . . . even ice water does not affect it.



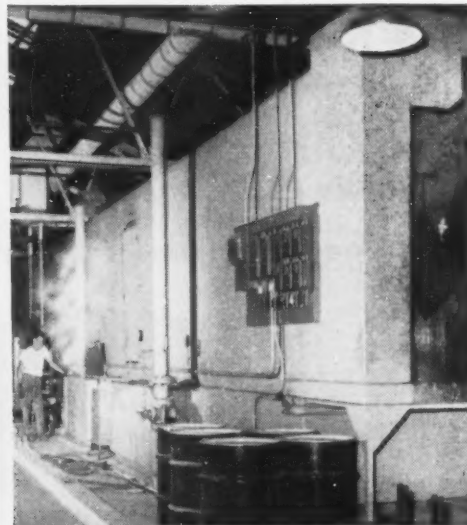
**MIXES READILY IN HARD WATER.** New S.E.C.O. eliminates the need for special hard-water grades of emulsifying cutting oil.



**GRINDING.** New S.E.C.O. improves surface finishes because its increased detergency prevents loading and glazing of grinding wheels, prolongs wheel life.



**RUSTPROOFING.** New S.E.C.O. is a better hot rustproofing medium. It forms stable emulsions, coats metal parts uniformly, protects them against rusting.



**WASHING.** Because of its increased detergency and its ability to mix and remain stable in hot water, New S.E.C.O. is better for removing grease and dirt from metals.

**TEST THIS NEW S.E.C.O. IN YOUR OWN PLANT.** For more information, call your nearest Sun office or write SUN OIL COMPANY, Phila. 3, Pa., Dept. IA-2.

**INDUSTRIAL PRODUCTS DEPARTMENT**  
**SUN OIL COMPANY**



PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

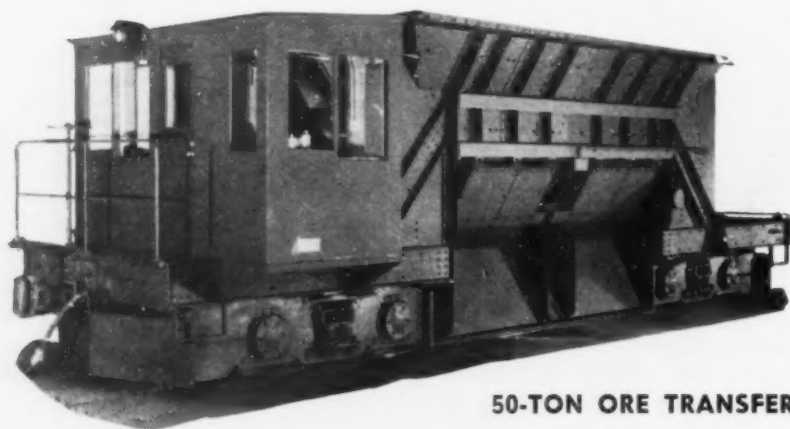
*Made by the producers of famous Blue Sunoco Gasoline and Dynalube Motor Oils*

# On the HIGHLINE



## It's ATLAS ORE TRANSFERS

It's Atlas Transfers for dependable, year-in, year-out service . . . for operator safety and convenience which approaches semi-automatic service.



50-TON ORE TRANSFER

This Atlas Ore Transfer is equipped with modern hydraulically-operated discharge gates and brakes. Steel plate trucks are provided. The cab is overhung at one side to give the operator a line of vision alongside the car. The car is equipped with electric space heaters.



**THE ATLAS CAR & MFG. CO.**

ENGINEERS

MANUFACTURERS

1140 IVANHOE RD.

CLEVELAND 10, OHIO, U. S. A.

### New Equipment

Continued

#### Lift table

The operator rides right along with the deck on this electrohydraulic stationary lifttable, to feed sheets or molds into varying levels. Platform is 36 in. wide x 48 in. long fitted with two 18-in. long rollers on the edge of one of the sides. Lowered height

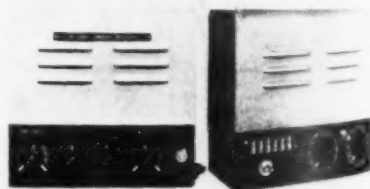


from the floor is 40 in., raised height 70 in. Capacity is 1200 lb. It is wired for 550 v, 3 phase, 60 cycle power, with 110 v control circuit of deadman raise and lower type mounted near the operator's hand. Unit is designed to be securely lagged to the floor. *Service Caster & Truck Corp.*

For more data circle No. 35 on postcard, p. 83

#### Electronic timers

Two fully enclosed repeat cycle electronic timers provide on-cycles ranging from 0.01 to 150 sec and off-cycles ranging from 0.01 to 900 sec. They are suitable for a wide range of industrial and laboratory



controls where the timing device must be stable and accurate in nominal changes of line voltage and temperature. They are housed in steel cabinets with external settings. *G. C. Wilson & Co.*

For more data circle No. 36 on postcard, p. 83

# The *Iron Age*

## SALUTES

*Glen C. Riegel*

The talents and energies of this top metallurgist have produced results in a variety of projects.



COMBINING full-time executive responsibilities with a half-dozen "extra-curricular" projects is normally a man-killing proposition. But for many years just such a program has been the routine accomplishment of Glen C. Riegel, chief metallurgist of Caterpillar Tractor Co. since 1930.

A pioneer in putting the "Hi-Electro" hardening process into workable production with the treatment of axle shaft journals and crank pins at Caterpillar, Glen has earned a wide reputation as a leader in the development of improved steel-hardening methods.

The Society of Automotive Engineers has long known Glen Riegel as an active and valued member. On the SAE's War Engineering Board he sparked the investigation of boron steel known as the Caterpillar Project. Busy on many SAE committees, Glen recently received an award for his work as president of the Engineering Materials Committee.

After working his way through Central College, Fayette, Mo., Glen spent 2 years at Illinois Steel Co.'s South Works. Joining Caterpillar in 1928 as an assistant metallurgist, he continued his education at Central YMCA College and the University of Chicago.

Glen's leisure is spent bowling, improving his "southpaw" golf or helping his wife Katherine with the garden of their Peoria home. In addition he has somehow found time to be a good citizen, having served Peoria as chairman of the Commerce Association's Health and Welfare Committee and of the Community Fund's Budget Committee.

Some of his additional activities in the field of metallurgy include memberships in American Society for Metals, American Society for Testing Materials and American Ordnance Assn. At Detroit in 1951 he led American and foreign experts in technical sessions of the ASM's Metallurgical Congress.



*riding comfort starts with*

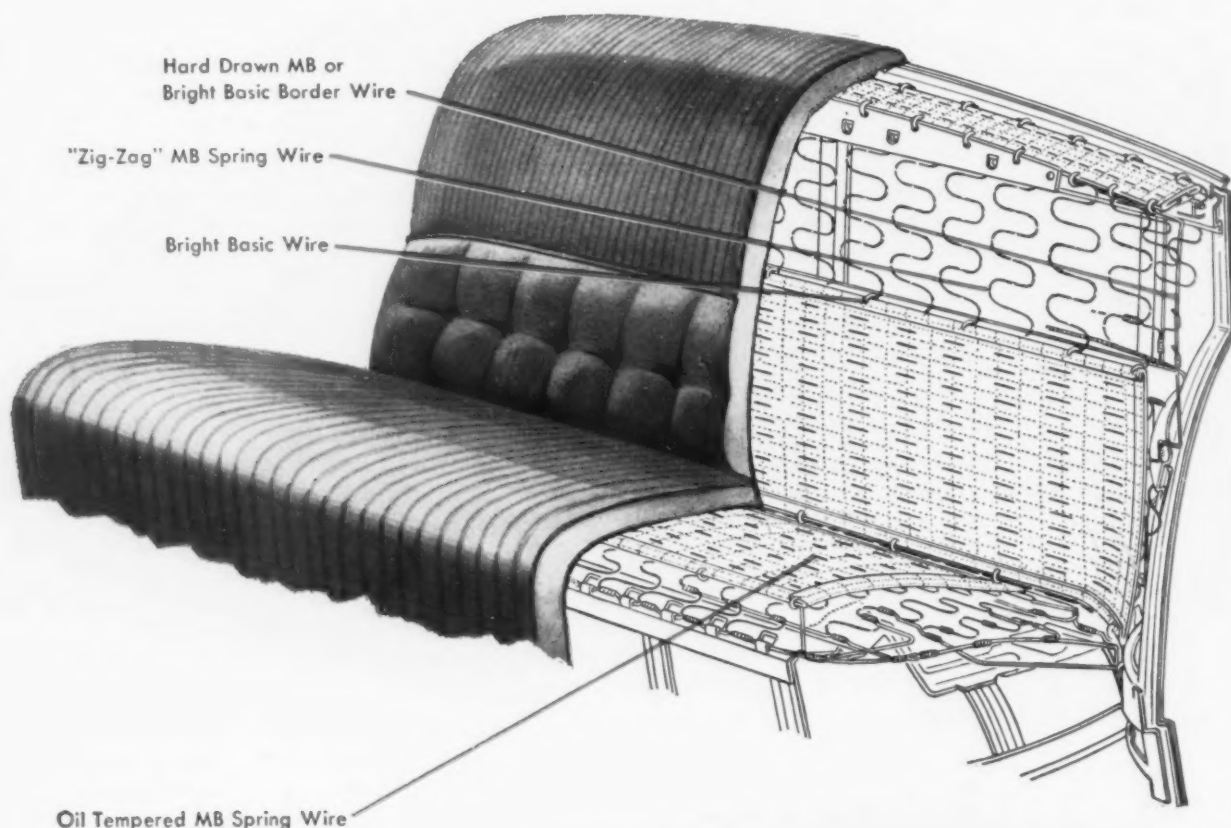
# Wickwire Wire



New types of spring construction for seat and back cushions add immeasurably to the smooth, easy-riding comfort of today's automobiles.

Here again, as in so many other instances, the complete range of Wickwire Wire—high or low carbon, in all tempers, finishes and grades—provides exactly the right kind of wire for all parts of the complete spring assembly.

Good reason why Wickwire Wire is selected for the cushion spring units on many of America's leading makes of cars. Good reason, too, why it will pay you to remember—For The Wire You Require; Check First With Wickwire.



THE COLORADO FUEL AND IRON CORPORATION—Denver & Oakland  
WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo  
Chicago • Detroit • New Orleans • New York • Philadelphia

**WICKWIRE WIRE**



PRODUCT OF WICKWIRE SPENCER STEEL DIVISION  
THE COLORADO FUEL AND IRON CORPORATION

# The Iron Age

## INTRODUCES

Joseph K. Salomon, named president, ROYAL METAL MANUFACTURING CO., Chicago; George C. Lautemann, named executive vice-president; and George H. Lowell, becomes secretary-treasury.

Albert W. Schede, elected president THE BELMONT IRON WORKS, Philadelphia.

Dr. Raymond B. Seymour, appointed president, ATLAS MINERAL PRODUCTS CO., Houston.

George T. Naff, elected president and a director of Texas Eastern Transmission Corp., Houston.

F. H. Ludington, Jr., elected vice-president, CHASE BAG CO., Chicago; William N. Brock, elected vice-president and general manager; and M. J. Bender, elected secretary.

A. J. Van Harn, appointed executive assistant to the president, GRINDLE CORP.

Walter M. Harks, appointed vice-president and director, BOWSER INC., Chicago; and Allan J. Tremper, was named administrator for the North Central Region.

Francis Weiss, appointed director, newly created Development Dept., ALLIANCE MACHINE CO.

Walter A. Wecker, elected a member of the board of directors, POOR & COMPANY, Chicago.

William E. Richey, elected chairman of the board of directors and treasurer, BLOCK IRON CORP., Albany; Louis G. Imperato, elected president; and John A. Stephens, appointed vice-president and secretary.

Victor G. Schwenke, appointed account executive, Ditzler Color Div., Detroit, PITTSBURGH PLATE GLASS CO.; and Everett G. Knox, also appointed an account executive.

Marion C. Wilson, appointed chief design engineer, Sales Dept., CALUMET STEEL CASTINGS SCRAP, Hammond, Ind.

Allan C. Johnston, appointed welding engineer, MARION POWER SHOVEL CO., Marion, Ohio.

Frank E. Smith, named sales engineer representative, East Coast Area, EXOTHERMIC ALLOYS SALES & SERVICE, INC., Bridgeville, Pa.

Bruno D. Hendrickson, named abrasive engineer in charge of western New York territory, NORTON CO., Worcester, Mass.

Thomas H. Brumagin, appointed chief engineer, AJAX FLEXIBLE COUPLING CO. INC., Westfield, N. Y.

Laurence W. McHugh, appointed controller, Hall-Scott Motor Div., ACF-BRILL MOTORS CO., Berkeley, Calif.

D. R. Berg, appointed manager of the Piping Dept., DRAVO CORP.; Pittsburgh; W. L. Davidson, appointed manager of the Heating Dept.; and E. N. Hower, appointed assistant manager of the Apparatus Dept.

Charles M. Conklin, named manager of irrigation pipe sales, ALUMINUM CO. OF AMERICA, Pittsburgh.

Frank M. Mansfield III, becomes manager of product programming, Carboly Dept., GENERAL ELECTRIC CO., Detroit.

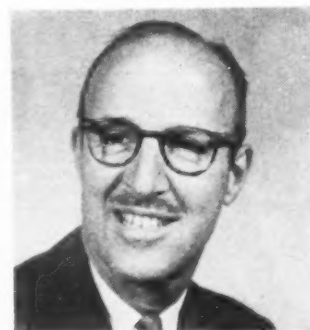
C. L. Kenny, appointed manager of products, Quaker Rubber Corp., Division of H. K. PORTER CO., INC., Philadelphia.



ALFRED J. PORTER, elected a vice-president, Heppenstall Co., Pittsburgh.



ROBERT G. HEERS, appointed manager, mining and raw materials, Kaiser Steel Corp.



DONALD L. PRICE, named sales manager, Abrasive Div., Norton Co., Worcester.

## Personnel

Edward E. Christopher has been named head, New York sales office, GENERAL REFRACTORIES CO.; Nelson W. Bowman, moves to Philadelphia office, and Thomas F. Fallon, appointed district sales manager, St. Louis.

John R. Ryan, appointed manager of explosives, operations, HERCULES POWDER CO., Explosives Dept., Wilmington, Del.

C. W. Greaves, appointed special assistant to the manager, San Diego Div., CONSOLIDATED VULTEE AIRCRAFT CORP.

J. T. Riday, appointed manager, South Bend, Ind. branch sales office, CUTLER-HAMMER, INC., Milwaukee.

W. D. Johnson, has been appointed general superintendent of all Liquid Gas Plants of THE LIQUID CARBONIC CORP., Chicago.

R. J. King, appointed sales manager of warehouse sales, ERIE SHEET STEEL CORP., Cleveland.

Nick A. Leyds, has been appointed district manager, new Mt. Vernon, N. Y., office, BRYANT CHUCKING GRINDER CO.; Caleb C. Brown has been named direct factory representative, Dayton, Ohio, office; and Walter Augusten has been named head of the new Indianapolis office.

Carl Lantz, promoted to general manager, ADMIRAL DISTRIBUTORS, INC., San Diego Div.

Jack Wright, has been appointed district manager, northwestern district, HYSTER CO., Portland; and James Rector, becomes district manager, Atlanta, of the southeast territory; and Robert Hile, has been appointed general manager, Chicago.

Earl A. Lerner, has been appointed sales manager, KENSINGTON STEEL COMPANY, Chicago.

Eugene J. La Porte, appointed assistant to the sales division manager, Cleco Div., REED ROLLER BIT CO.



FRANCIS M. HERNAN, elected controller, Fruehauf Trailer Co.



ALVIN L. KRIEG, appointed director of public relations, U. S. Steel Corp., Utah-Intermountain district.



OTMAR C. MILLER, appointed engineer, Steel & Tube Div., The Timken Roller Bearing Co.



JAMES S. MILLIKEN, appointed sales engineer, Engineering Works Div., Dravo Corp., Pittsburgh.

A-1033

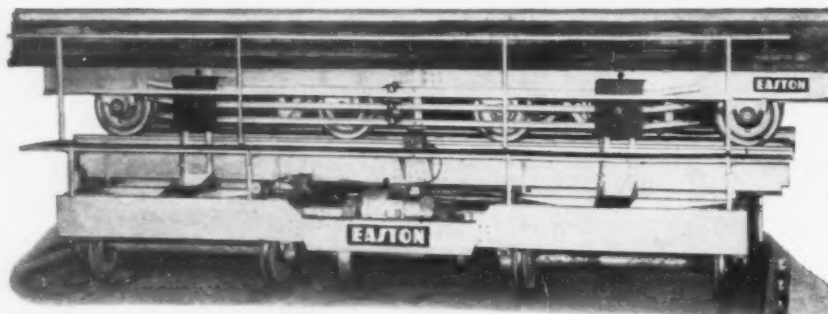


# EASTON

EASTON experience covers small and large capacity furnace cars for every requirement.

## Furnace Cars

Electric furnace car mounted on electric transfer car for completely automatic continuous heat treating system.



EASTON CAR & CONSTRUCTION COMPANY • EASTON, PA. • NEW YORK • PHILADELPHIA • PITTSBURGH



# eliminate the guesswork in selecting tool steels

Thousands of metal working people are using the Crucible Tool Steel Selector to determine exactly which type of steel they need. This handy selector covers 22 tool steels which fit 98% of all tool steel applications.

The selector is unique because it starts with the ultimate use of the steel. It breaks down all tool steel applications into six major classifications, under which the different grades of steel available for certain specific requirements are indicated in legible cutouts. Heat treatment and machinability data are also included for each grade.

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## HERE'S AN EXAMPLE:

Application — Deep drawing die for steel

Major Class — Metal Forming — Cold

Sub-Group — Special Purpose

Tool Characteristics — Wear Resistance

Tool Steel — Airdi 150

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Company \_\_\_\_\_ Title \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_

# CRUCIBLE

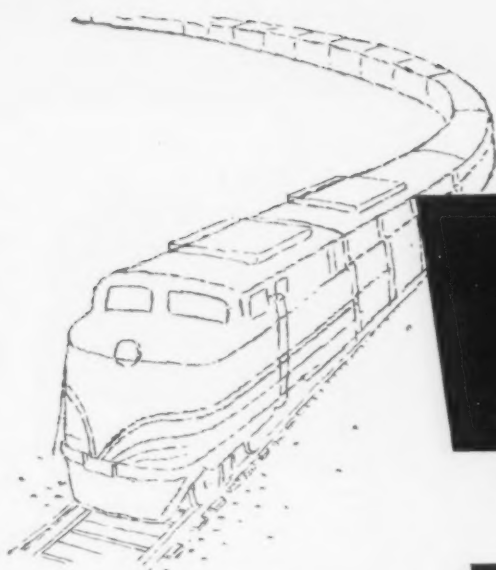
first name in special purpose steels

54 years of *Fine* steelmaking

# TOOL STEELS

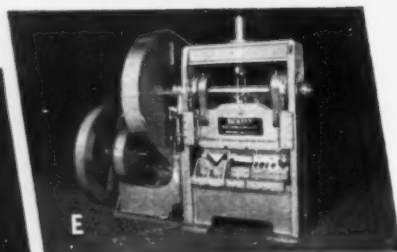
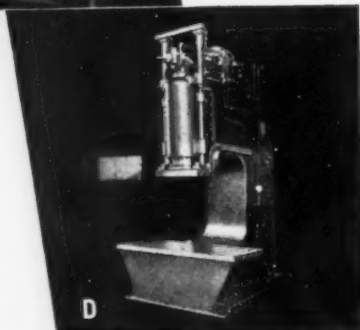
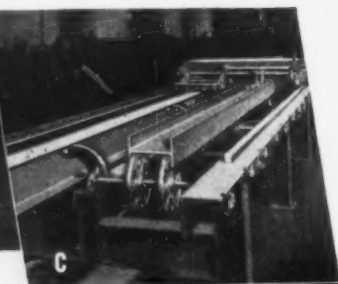
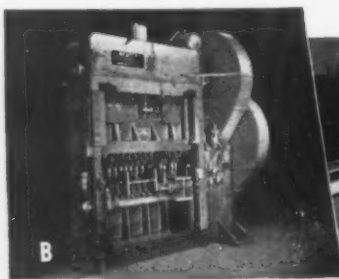
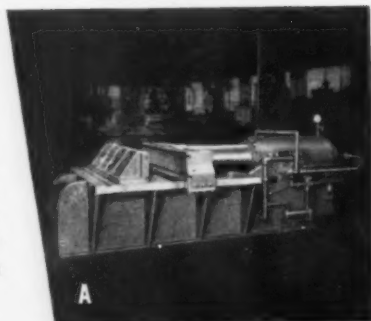
CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.

February 25, 1954



**power  
+  
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When the schedule calls for prompt delivery of goods, the diesel engineer can "pour on the oil" for reserve power. BEATTY metal fabricating machines have this same type of built-in power reserve for industrial production purposes. One of the machines illustrated can be modified to fit your particular needs. Or, if you prefer, call in our engineers to design and build a machine to your exact requirements.



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B. BEATTY Guillotine Beam Punch. Punches webs and flanges in "I" beams from 6 to 30 inches.

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**BEATTY**  
MACHINE & MFG. CO.  
HAMMOND, INDIANA

## Personnel

*Continued*

Charles F. Johnson, assistant secretary and city sales manager, KROPP FORGE CO., has retired after 32 years with the company.

Kenneth M. Halverson, appointed purchasing agent, FORD DIVISION, Atlanta assembly plant; and Charles C. Walker, has been appointed plant administrative assistant. Mr. Halverson replaces Karl G. Johnson, who has been transferred to an engineer's position, Manufacturing Standards Department, Atlanta plant.

George F. Powell, named Pittsburgh district sales manager, Delco Power Tool Div., ROCKWELL MFG. CO.

Ward M. Troutman, named district sales manager, GENERAL REFRACTORIES CO., Philadelphia, and Fred W. Schwartz, named assistant district sales manager, Pittsburgh office.

Marcus M. Fisher, appointed assistant comptroller, U. S. STEEL CORP., New York.

Harold C. Templeton, appointed chief metallurgist, LEBANON STEEL FOUNDRY, Lebanon.

George N. Jarvis, promoted to plant engineer, Monessen, Pa., Works, PITTSBURGH STEEL CO., Pittsburgh.

Norman A. Malone, Jim Quinn, and Charles W. Kies, appointed direct factory sales representative for the state of Ohio, CHAMPION SCREW COMPANY.

Bernard L. Orell, appointed director of the Forest Products Div., Business and Defense Services Administration of the U. S. DEPT. OF COMMERCE.

Joseph C. McCarthy, appointed Canadian sales representative, Robertshaw Thermostat, American Thermostat and Grayson Divisions, ROBERTSHAW - FULTON CONTROLS CO., Greensburg, Pa.

A. D. McCombs, appointed branch manager, new factory branch in Albany, TRAILMOBILE INC., Cincinnati.

Carlos H. Horne, promoted to assistant general manager, Western Division, RHEEM MANUFACTURING CO.

# The Modern Industrial Furnace— Its place in your profit picture

Progress in industrial heating equipment in the last decade has been much greater than most manufacturers and engineers realize.

The science of metallurgy has been under forced draft. Jet propulsion and atomic energy production made it necessary to discover new facts about heat resistance. For both war and peace we demanded higher standards for machineability, hardness, durability, surface brightness and many other qualities.

Technology in the form of new equipment has kept pace with the new discoveries. Better than ever before we know what conditions will produce the qualities we want in metals, and better than ever before the new equipment provides what is needed.

Industrial heating equipment must be judged by 1954 standards—by the demands of the new era of competition and by the performance which only modern design can give. Old furnaces are much like the one-horse shay that looked as if it would never wear out. They appear to be the most durable of durable goods.

If 30 pct of machine tools are obsolete, as many surveys indicate, certainly 30 or 35 pct of all industrial furnaces now in use in American industry are obsolete. By the standards that prevailed when they were built they may still have a lifetime of wear left in them. But by the standards that modern users demand they can no longer justify their existence and they should be replaced. The winners in the competitive market ahead will be the producers who take advantage of the new equipment.

The modern producer looks to cost saving. He finds that the new furnaces save manpower and time. Many are automatic; a single piece of equipment does in one continuous operation what several separate units used to do. Some processes that used to require days are now completed in hours. Spoilage is reduced as a result of scientific control which has replaced fallible human judgment. New controlled atmosphere and salt bath processes cut losses of metal in descaling and grinding operations.

The new equipment is safer, and it uses fuels more efficiently. It is designed to take its place in a continuous production line, thus saving space and materials handling costs.

The successful manufacturer sets higher quality standards than ever before. He finds

that the new furnaces not only reach higher standards but maintain them consistently. They incorporate the latest technology based on the most advanced knowledge of metallurgy. Where bright surfaces are required the modern furnaces can provide them. Carbon content can be held within closer tolerances than ever before. Forced convection reduces the time required to heat and cool. It insures temperature uniformity. Whatever the requirements, the new equipment provides scientifically controlled treatment. The modern furnace is, in fact, a precision machine.

New equipment, far more versatile and accurate than any in the past, makes heat treating practical for many products never before susceptible to this improvement.

Powder metallurgy may be the answer for many companies making small parts under conditions of high machining costs. New equipment and new sources of metal presage a revolution in this field.

Less spectacular, but often the difference between profit and loss, is the need for modernization of conventional heat treating processes in thousands of plants.

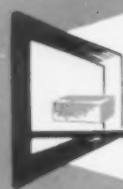
There is no longer any excuse for tolerating discoloration where brightness is important. Why expose work to corroding air on the way to an old-fashioned quench tank? Why incur the waste and quality deterioration that come from lack of pre-heating and slow-cooling equipment? Why subject hot metals to the impurities of the natural atmosphere when the right chemical elements can be provided in controlled atmosphere furnaces or salt baths? Why waste tons of metal in grinding and descaling after old-fashioned heat-treating processes?

Heat treating is one of the oldest industrial arts, but never has it advanced as rapidly as in recent years. Never were the advantages of replacement of old heat-treating equipment greater than in 1954.

## AN ACKNOWLEDGMENT

The editors wish to thank the member companies of the Industrial Furnace Manufacturers Association, and particularly its executive vice-president, Carl L. Ipsen, for their cooperation in furnishing material for this special feature.





# Surface Treating & Hardening

- Carbonitriding
- Carbon restoration
- Carburizing
- Cyaniding
- Nitriding
- Straight hardening

**S**CALE elimination and carbon control by controlling furnace atmospheres are major achievements in surface treating and hardening in recent years . . . Next is the enclosed quench, avoiding scale, saving heat and time . . . Faster, more uniform heating by convection—often with radiant gas units—is another. Materials handling—by integrating furnace units and by mechanical devices—has improved rapidly . . . New refractories reduce heat loss, permit easier maintenance . . . Automatic control of time, temperature and atmosphere saves fuel and manpower, improves product quality.

## Forgings:

**Integrated U-shaped line cuts labor and fuel costs by 50 pct, saves space.**

A 50 pct reduction in labor and fuel cost was achieved in the heat treatment of carbon, stainless and alloy forgings by the use of an integrated heat treating line by Interstate Drop Forge, Milwaukee. The line consists of a belt type hardening furnace, two quench tanks, one water and one oil that can be positioned as required under the quench chute. A continuous belt draw furnace completes the setup.

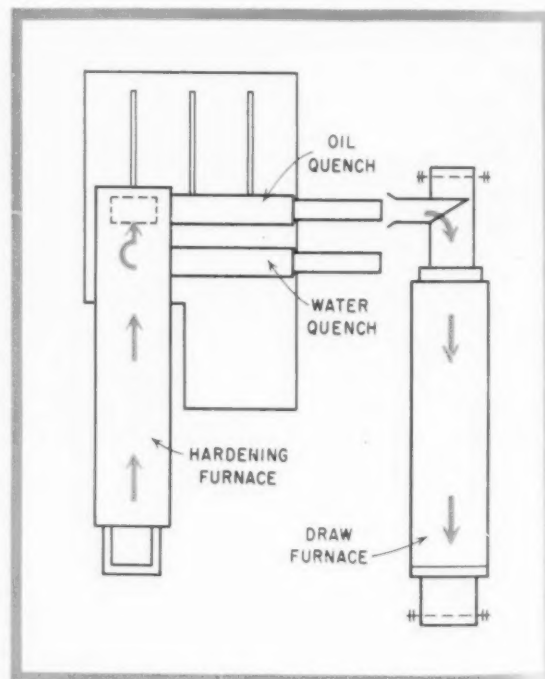
The work from the hardening furnace is handled by an alloy discharge chute entirely enclosed within the furnace. This protects the work by the products of combustion up to the time it enters the quenching medium. The discharge chute is water-jacketed to prevent excessive flash-back of the quenching oil.

An important feature at the discharge end of this unit is an alloy skid plate that can be positioned for automatic discharge of the work onto a discharge table outside the furnace, making it possible to handle special materials which require manual quenching and provides a method for normalizing and annealing.

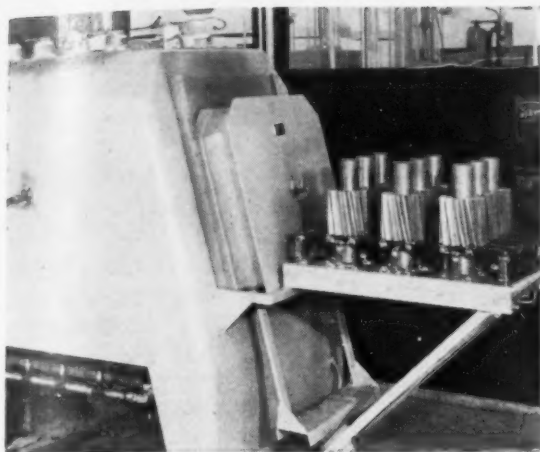
The forgings are drawn in a continuous recirculating draw furnace having a maximum operating temperature of 1200°F. Usable heating space is 36 in. wide by 16 ft long. It is

equipped with an alloy chain bar-belt, driven through a variable speed drive to obtain correct drawing time.

This line is U-shaped to fit the available floor space.



**FORGINGS** in carbon, alloy and stainless steels heat treated in this setup showed 50 pct less fuel and labor cost than the former method.



**ROTARY PUMP GEARS** are under complete cycle control in this unit. It cut distortion, grinding time, eliminated pickling and blasting.

## Rotary Pump Gears:

**Complete cycle control ends distortion, stops costly machining and grinding.**

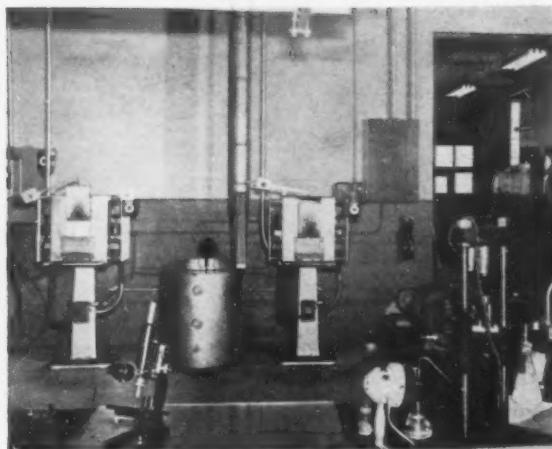
A distortion problem in heat treating large rotary pump gears has been solved for Geo. D. Roper Corp., Rockford, Illinois. Grinding time on the 70-lb gears has been cut, pickling and blasting operations eliminated by using an automatic controlled atmosphere box type heat treating unit.

Complete cycle control is producing uniformity in the 16-in. long gears which, when mounted in the completed pump, must be absolutely true to maintain pumping efficiency. Automatic heating and quench control duplicates results regularly.

The former method of heat treating caused considerable distortion of the trunnions, necessitating costly additional machining and grinding. And it left softness near the hub of the gears. Distortion is now held to within .004-in. run-out, assuring pumping efficiency and quiet gears. Trunnion stock is reduced and considerable savings in grinding time are effected.

The gears, of C-1141 steel, are carburized for  $4\frac{1}{2}$  hr at  $1700^{\circ}\text{F}$  to a depth of 0.030 to 0.035 in. After carburizing, the work moves automatically into a sealed zone for quenching in oil at  $150^{\circ}\text{F}$ . Workpieces are then tempered for 2 hr at  $450^{\circ}\text{F}$  to a final hardness of 57-58 Rc.

With endothermic furnace atmosphere, the gears remain bright and scale-free, eliminating blasting and pickling. Absence of scale also permits inspectors to quickly and easily detect any surface defects. The center-hole, which formerly had to be cleaned in a separate operation, is now bright and scale-free, requiring only washing prior to assembly.



**HIGH SPEED TAP** hardening is free from decarburization in these electric batch type furnaces for high temperature heat treating.

## High Speed Taps:

**Blanks hardened without decarb in electric batch type furnaces.**

In a plant of the Charles L. Jarvis Co., North Attleboro, Mass., molybdenum high speed steel solid and fluted tap blanks are being hardened entirely free from decarburization. This eliminates several operations usually performed in making taps. Desirable hardening quality is easily and consistently attained with a battery of small electric batch type furnaces designed especially for high temperature heat treating of air hardening alloys and high speed steel.

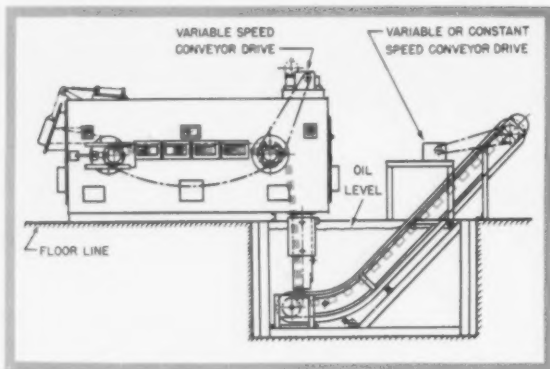
Equipped with a silicon carbide muffle chamber, the furnaces are heated through silicon carbide resistors located above and below the muffle chamber. Heating elements and terminals are readily accessible from either side of the furnace and are protected by asbestos shields and removable guards.

Over a period of two years rejections due to improper hardening have been negligible due primarily to the use of this modern equipment which is capable of accurate control both of temperature and protective atmosphere.

## Iron Brake Parts:

**Electric conveyor hardening unit boosts production by 400 pct.**

Production hardening of high grade pearlitic iron castings for tractor disc brakes and clutches was increased 400 pct at the St. Joseph, Mich., plant of Auto Specialties Mfg. Co. by replacing two batch type, semi-muffle furnaces with an electric conveyor hardening unit. As much work is being turned out in three man



**IRON BRAKE PARTS** showed a 400 pct production increase with this electric conveyor hardening unit, which has a fully enclosed belt.

## Small Springs:

**Electric appliance maker saves \$12,000 a year with shaker hearth furnace.**

A shaker hearth type furnace for heat treating small parts results not only in savings in heat-treating time, low cost operation, less material handling, and labor costs but also secondary savings, such as pickling or cleaning, and rigid inspections can be eliminated due to the scale free, uniform treatment of each part.

An electric appliance manufacturer saved \$12,000 the first year of operation in the heat-treatment of small springs. Formerly three people were required to heat-treat 50,000 parts per week. Girls positioned the parts on trays which were put into box furnaces, heated, and then quenched. Each spring then had to be inspected and spoilage ran as high as 18 pct. Now the same number of parts are treated in 7 hr. The supervisor in his spare time fills the

days as was formerly done in 15 man days.

Previously, it was necessary to use three operators working around the clock to handle the expanding hardening requirements.

This furnace has a completely enclosed belt with hot return variable speed belt drive, atmosphere tight furnace shell, internal and external quench chutes, and Nichrome heating elements. It is fully portable.

Scaling and decarburization have been eliminated, uniformity of physical properties on both short and long-run jobs has been increased. Pyrometer set points and variable speed belt drive settings may be preestablished eliminating the need for a skilled operator.

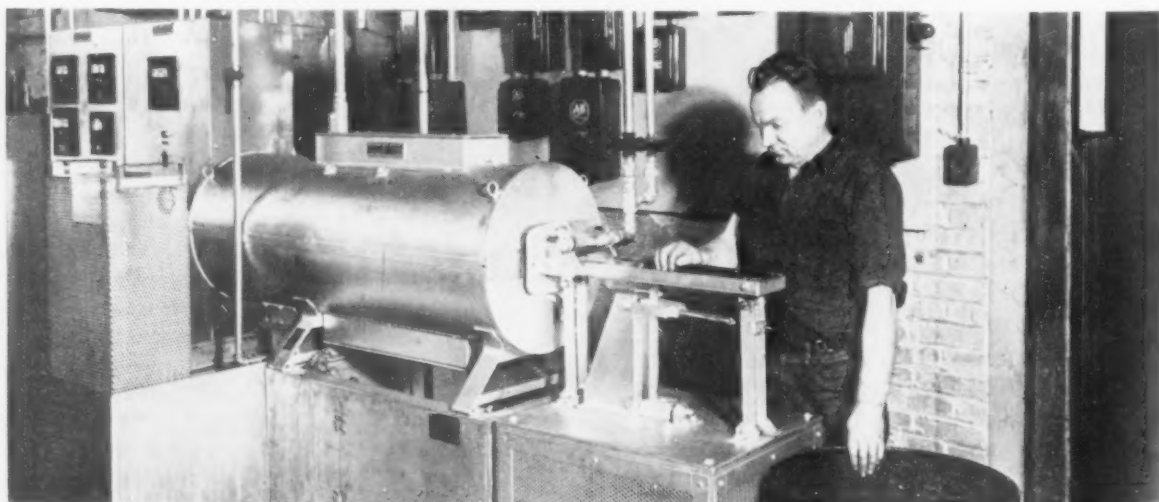
Other company products heat treated in this furnace include high alloy steel shot blast blades and hydraulic and mechanical jack parts.

hopper, and adjusts the time cycle for the part being treated; the rest is automatic.

Inspections have been eliminated because shape distortion is no longer a problem and close control of the characteristics of springs and other small components is assured. Because of its compactness and low heat loss, the furnace is installed where the parts are used, eliminating extra handling and delays.

This shaker hearth furnace can be used for hardening, carburizing, dry cyaniding, and similar heat treating operations requiring temperatures to 1900°F. Capacity is 175 lb per hr.

Parts are fed from a hopper onto the oscillating hearth plate which moves them through the heating zone and discharges them directly into the oil quench. This unit's quench tank has two perforated baskets for hand removal, but a conveyor may be installed for automatic removal of quenched parts. Marquenching using heated salt or oil in an insulated quench tank may also be performed.



**SMALL SPRINGS** for appliances are now uniformly treated, scale free, in this shaker hearth

furnace. First year's savings were \$12,000. The furnace has a capacity of 175 lb per hr.



## Pneumatic Tools:

**Controlled atmosphere batch unit saves half of initial furnace cost in year.**

The Keller Tool Co., Grand Haven, Mich., manufactures pneumatic tools that require a large number of small, close tolerance, intricate parts.

Batch processing in an automatic, controlled atmosphere heat-treating unit, with completely automatic heating and quench control, has eliminated difficulties in heat-treating these small parts and has also substantially reduced production costs.

This company found it possible to use less critical lower cost steels for many parts while obtaining the same, if not better, results than with more expensive materials. In one operation, approximately 25¢ per lb is being saved by eliminating the need for an air-hardening steel. Since the average requirement for this type of steel was 25,000 lb a year, a single year's saving equalled half of the total installation cost of the furnace.

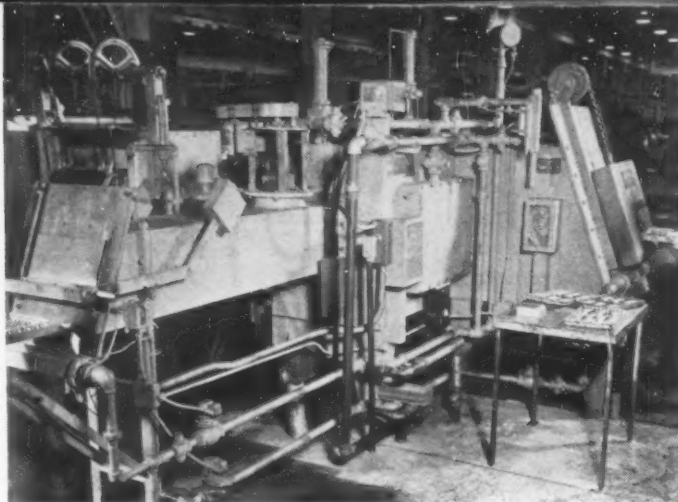
Using controlled atmosphere, parts come out bright and scale-free giving a sizable reduction in cleaning cost, since it is now only necessary to remove quenching oil from the parts. With automatic control from heat through quench, distortion of the workpieces has been practically eliminated, making costly straightening unnecessary. Automatic processing also means that the furnace can be operated by an inexperienced heat-treater.

## High Speed Steel:

**Production up 53 pct, grinding cut by 50 pct with pusher type muffle unit.**

Production was increased 53 pct and grinding time reduced 50 pct by replacing three batch type high speed furnaces with one modern pusher type full muffle atmosphere furnace at Ingersoll Milling Machine Co., Rockford, Ill. This company was treating high speed cutter blades by first heating in a low heat furnace then transferring to a preheat and finally to the high heat furnace. This procedure developed a scaled surface which caused cracks, warpage and otherwise poor quality. In addition, extra stock had to be left on the cutters so the parts could be finished by grinding. Production of 55 lb per hr by this method also was inadequate.

The new controlled atmosphere high speed furnace has eliminated the scale condition. Blades are now finish machined prior to heat treating, cutting down grinding time. And an additional annual savings of \$2,325 was effected by elimination of sandblasting.



**HIGH SPEED STEEL** cutter blades are treated in this L-shaped unit which replaced three other furnaces, with a 53-pct increase in production.

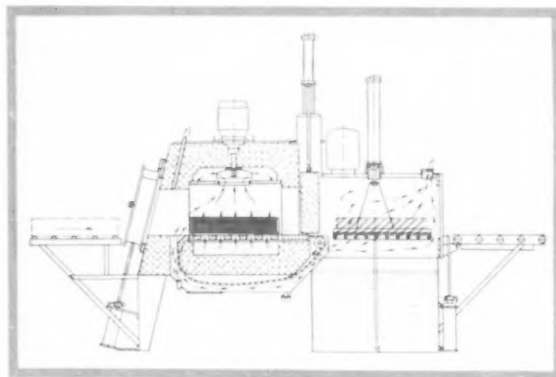
This furnace is an "L" shape design featuring charge and discharge vestibule, separate preheat, high heat, and cooling sections. It is electrically heated and the cooling section is water jacketed and uses fan circulation inside the chamber for fast cooling. The unit has atmosphere protection throughout.

## Aircraft Bolts:

**Automatic dew point control assures accurate carbon restoration control.**

Dependable and reproducible results of carbon restoration in jet aircraft bolts is accomplished with an automatic, controlled atmosphere box type heat treating unit. By automatic control of furnace atmosphere dew point, the carbon potential of the atmosphere is regulated at all times, with uniform carbon restoration results.

An aircraft bolt manufacturer receives material for  $1\frac{1}{2}$ —20 x  $1\frac{1}{2}$  in.—12 point bolts from the mill with surface decarburization, which



**AIRCRAFT BOLTS** are held to close specifications in this furnace which automatically controls dew point to regulate carbon restoration.

must be removed or carbon restored. Carbon restoration presented an exceedingly difficult problem as surface carbon content had to be identical to base carbon content within AMS carbon limits of 0.38—0.43.

Formerly, decarburized surface was removed by centerless grinding or machining. This often produced heat checks, which became cracks during heat treatment and thread rolling.

Now processed in a Controlled Atmosphere furnace with complete cycle control from heat through quench, the bolts, with 12-point heads already formed, undergo carbon restoration and hardening at 1600°F to a uniform hardness of

about 54 Rc, then tempered to 26-32 Rc to give toughness and strength before roll threading.

Carbon absorption is accurately measured by placing several pieces of 0.005-in. thick shim stock in the load. After carbon restoration and hardening, shims with a previous carbon content of only 0.05 show an average gain in weight of .0487 grams, or an increase in carbon content of 0.459 per cent.

A full tray of some 400 lb of the jet aircraft bolts is processed for 2½ hr at heat. No special care is required in arranging the workpieces in the tray. After manual loading, the trays are moved automatically through heat and quench chambers. Pre-set heat and quench cycles, temperature and atmosphere controls, maintaining a plus 45°F dew point, assure uniform results.

## Screw Fasteners:

**Producer meets rigid market demands, cuts costs with continuous belt furnace.**

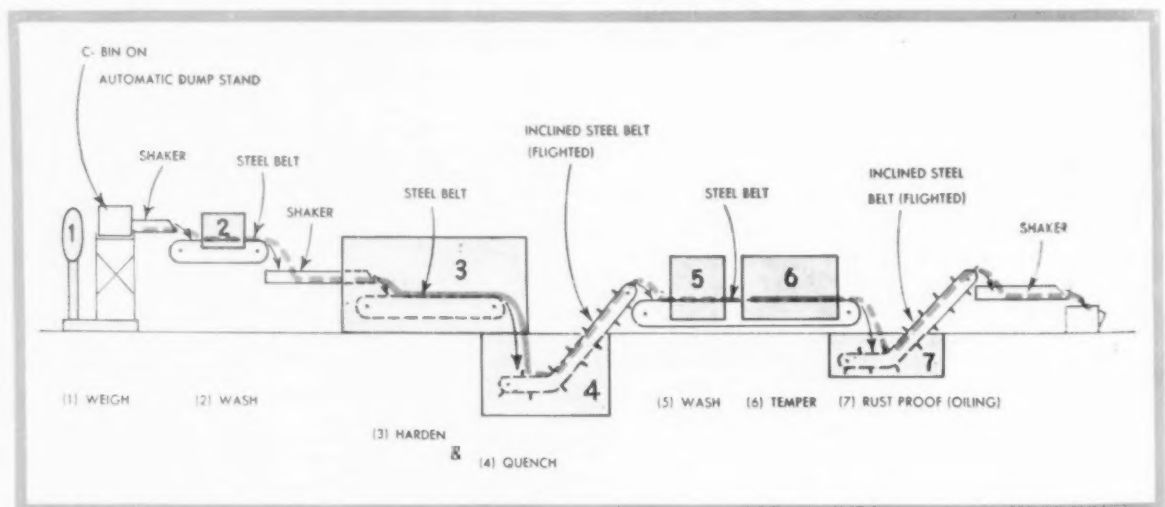
By being able to restore carbon to decarburized stock and heat treating after all forming operations are completed a manufacturer of screw fastenings was able to meet very rigid market demands, boost production, cut costs.

This company has been using a carbon restoration-hardening process in an alloy link belt continuous furnace with exceptional success. To satisfy demands for screws and bolts that are completely free from decarburization, it now thread-rolls or otherwise forms the parts, then heat treats in a carbon restoring atmosphere. Screws are made from cold-drawn 1035, 1040 and 8640 with decarburization often as much as 0.007-in. deep. Cyaniding and carburizing had been tried but were said to be impractical in this case due to high surface hardness and brittleness.

Two 18-in. wide belts in this furnace are fed by individual vibratory feeders. The screws are in the heating chamber about 70 min and at temperature (1420 to 1600°F) for 35 to 40 min. Straight RX gas with a dewpoint of +15° F at the generator and +50° F in the heating chamber is used for all production which is as high as 1000 lb per hr.

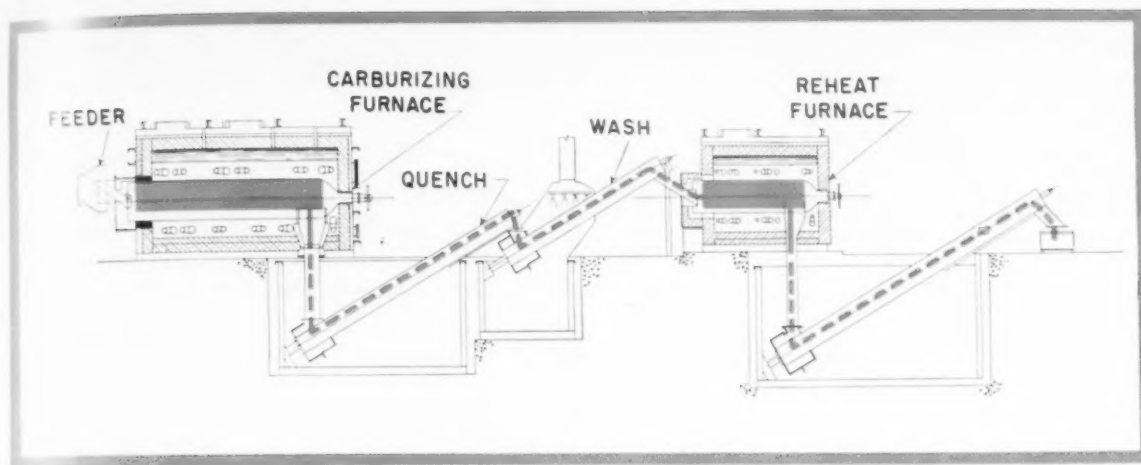
By totally enclosing the belt within the furnace proper, the result is a gas-tight heating chamber excellent for controlled atmosphere applications. The heating chamber can be zoned for any heating cycle. Gas-fired multi-pilot radiant tubes, above and below the work provide uniform heating across the chamber.

At the discharge end of the belt, parts drop into a chute extending below the quenchant level and onto an inclined belt conveyor (see sketch). The chute being constantly filled with atmosphere prevents contamination of the furnace atmosphere by water vapor or fumes from the quench.



SCREW FASTENERS receive carbon restoration and hardening treatment in alloy link con-

tinuous furnace. Eight separate operations are performed with connecting conveyor belts.



BEARING RACES are carburized, quenched, washed and drawn at rate of 368 lb per hr in

rotary retort furnace line. Case depth of 0.35 to 0.40 is achieved on a 7.7-hr carburizing cycle.

## Bearing Races:

**Automaker uses rotary retort to cut fuel, handling on 7200 pieces per hour.**

In an automotive plant small bearing races are carburized, quenched, washed and drawn, at the rate of 368 lb or 7200 pieces per hr in a rotary retort furnace line. Gas consumption has been considerably reduced and maintenance and manual handling of the parts cut to an absolute minimum.

Races are heated to 1700° F in enriched RX gas, carburized and cooled in three zones in the carburizing furnace and direct quenched in oil under atmosphere protection. After quenching, a perforated drum with internal spiral screw similar to the furnace retort, carries the hardened races out of the quench through a

washer to the draw furnace. This is also equipped with a rotary retort heated to 375° F by forced convection. A case depth of 0.35 to 0.40 in. is achieved on SAE 1117 steel with a carburizing cycle of 7.7 hr.

Atmosphere gas is introduced into the cast alloy hardening retort at the center of the discharge end and the heating chamber. Positive pressure created in the retort prevents air contamination and eliminates the need for special seals. The alloy retorts contain internal screw threads that impart an oscillating type of forward motion to the parts by intermittent reversing rotation of the variable retort drive. The slow progressive motion is gentle and non-abrasive, with little impact on the heated parts and assures maximum exposure of parts surfaces to the carburizing atmosphere.

## Die Treating:

**Dual salt baths increase die life, reduce warpage caused by former method.**

By using a two-bath submerged electrode salt bath setup, a large eastern shoe die manufacturer has increased die life from 300,000 stampings to more than a million. Dies are now martempered with minimum warpage. Rate is 200 lb per hr. The previous method was to heat in a box type furnace and oil quench. This caused warpage and required a later draw operation. Subsequent straightening operations broke many dies.

Now the dies are heated to 1550°F, then quenched directly into another salt bath at 450°F, then air cooled and water rinsed. Dies are scale free and bright.

## Lawnmower Blades:

**One man handles dual salt bath unit, produces up to 600 pieces per hour.**

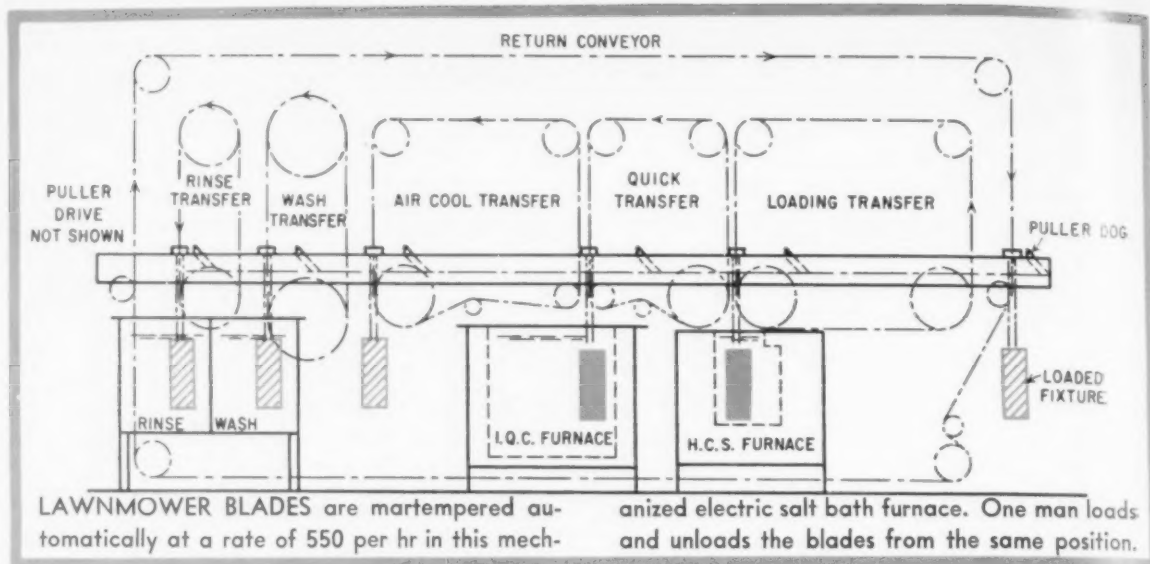
Austempering of lawn mower blades by an automatic electric salt bath installation is producing better blades faster and at less cost. Yardman, Inc., Jackson, Mich., changed from another process to salt bath methods for treating its blades and obtained excellent results.

The setup includes one bath at 1600°F for heating, one bath at 600°F for quenching one wash tank and a rinse. Blades are suspended on wires in lots of 55 and blades can be hardened in 5 min.

The installation is completely conveyORIZED. One man handles the entire production, including both loading and unloading blades.

Blades suspended from hooks are raised by the conveyor mechanism and lowered into the 1600°F salt bath. Following a 5-min heating





cycle, blades are transferred to the 600°F salt bath where they are held for 5 min. Washing in hot water requires 5 min, after which the conveyor returns the hardened blades to the furnace operator at the loading end of the furnace. Simultaneously a new load enters the furnace. Capacity of the furnace is more than 600 pieces per hour.

Submerged electrodes are used in heating the salt baths to assure long life through elimination of contact with air. Neither the elec-

trodes nor the pots have required replacement after 2 years' service. A ceramic pot is used for austenitizing while a welded steel pot is used for the lower temperature, isothermal quench.

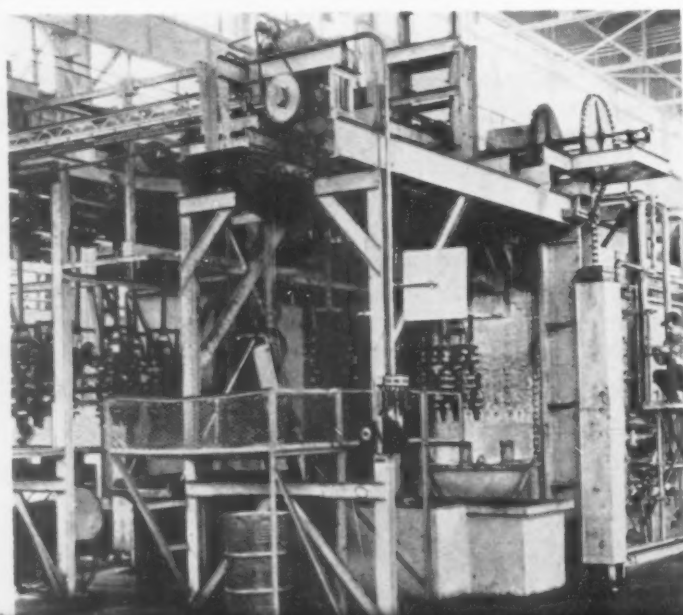
This method of heat treating produces greater toughness and ductility in the parts. No draw or tempering operation is necessary. A critical combination of hardness 48 to 52 Rc with a great degree of toughness is obtained regularly on the SAE 1065 steel blades.

## Crankshaft Forgings:

**Heating, forging and heat treating combine for 2 to 3 times former output.**

High quality crankshafts are being produced automatically by a process which includes continuous heating, press forging and heat treating at the Chrysler Corp. Dodge Forge Plant, De-

CRANKSHAFT FORGINGS are hardened, quenched, drawn and cooled automatically in continuous automatic furnace.



troit. Production is two to three times faster than former methods.

The heat-treating setup is made up of three separate units, each having a hardening furnace, quenching tank, a draw furnace and a cooling station. These three units are combined into a complete automatic installation capable of heat-treating 456 forgings per hour.

Crankshaft forgings are carried through the complete heat-treating cycle in a vertical position. An overhead conveyor brings the forgings from the presses to the hardening furnace, where they are manually transferred to the heat-treating monorail system.

Dual monorails suspended over slots in the furnace roof pass the forgings through the complete heat-treating cycle in 90 min. The forgings are heated to 1560°F and quenched in water. From the quench the forgings pass through the draw furnace at 1120°F to a tank where they are cooled for handling. The crankshafts are then automatically fed to a common monorail from each line which carries them to the shot blasting department.

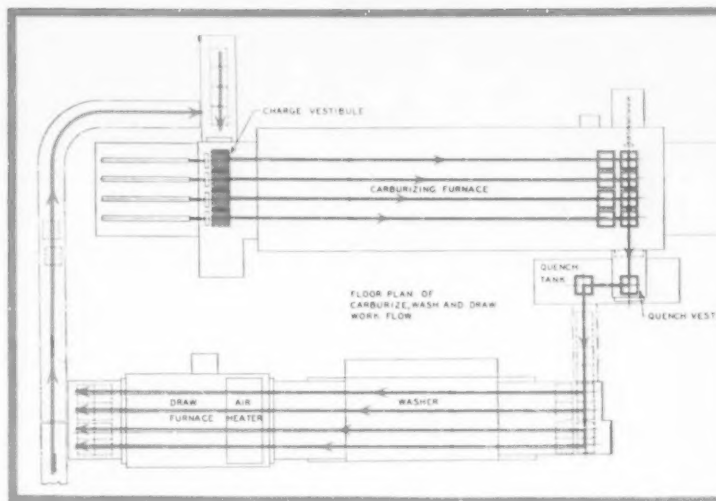
The heat-treating operation takes place with the absolute minimum of manpower since the only manual handling is the transferring of forgings from one conveyor to another at the central loading station. This installation is typical of the new trend toward automation in industry.

## Heat Treating Gears:

**Gears carburized on continuous unit have uniform case, controlled depth.**

Standardizing on modern continuous radiant tube pusher gas carburizers has enabled a leading automotive gear manufacturer to increase output, achieve more uniform results and cut operating and production costs in the heat treatment of gears, shafts, and other parts. This huge installation, probably the largest in the United States, includes nine complete carburizing lines, each turning out 800-1000 lb of gears per hr. Each line is completely automatic through charging, heating, quenching, washing, drying and drawing. (See sketch.)

Carburizing in a continuous pusher furnace, with individually controlled work rows and prepared atmosphere, produces work with uniform cases, controllable in depth and composition, because time, temperature and gas com-



**HEAT TREATING GEARS** in continuous unit with each work row individually controlled.

position can be readily adjusted and controlled. It is also possible simultaneously to carburize a variety of parts, requiring cases of different depths.

## Small Stampings:

**IBM gains by switch to 1010 steel, carburized and hardened in box type unit.**

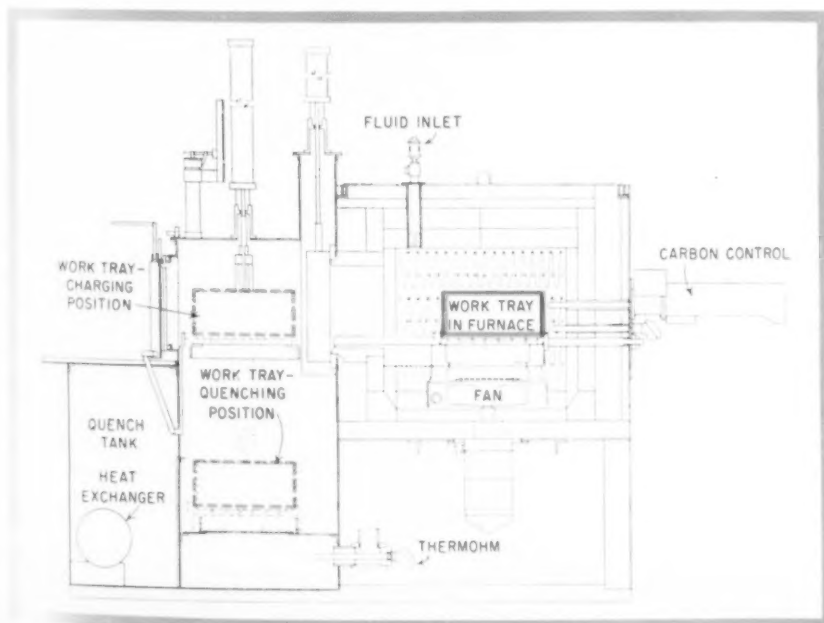
Stamped brackets formerly made of 1065 steel are now being made of 1010 and carburized. The International Business Machine Corp., Poughkeepsie, N. Y. encountered many stamping difficulties in the manufacture of this bracket. By switching to 1010 steel, carburized and hardening in an atmosphere box type furnace IBM had increased die life, reduced rejects, increased production and cut costs.

With this furnace parts can be hardened, carbon restored or carburized without once being exposed to air. This furnace is electrically heated and uses forced convection to circulate

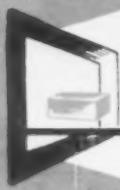
heated atmosphere through the heating chamber, vestibule and quench tank.

The atmosphere is generated within the heating chamber when a carbonaceous fluid is released into the hot chamber. A carbon detecting element is located in the heating chamber and monitors the atmosphere for carbon potential while it is being circulated. Through the detecting element the carbon potential is automatically adjusted by release of fluid into the furnace.

The oil quench tank is located under the vestibule of the furnace and work is quenched without leaving the atmosphere of the furnace. The oil can be cooled by an automatically controlled heat exchanger or heated as required by immersion heaters located in the quench tank.



**SMALL STAMPINGS** formerly of 1065 steel are now made of 1010 and carburized in atmosphere box type furnace which automatically adjusts carbon potential. Unit is electrically heated, circulates atmosphere by forced convection.



# Controlled Heating and Cooling

- Annealing
- Normalizing
- Malleablizing
- Bright Annealing
- Stress Relieving

**C**ONTROLLED heating and cooling processes have been advanced considerably by continuing developments in furnace design and auxiliary equipment . . . Vertical strip annealing furnaces improve strip quality, save floor space, reduce in-process inventories . . . Elevator and bell-type furnaces reduce fuel costs through better heat conservation . . . Processing time is lowered by using multiple batch cycling units . . . Convection heating with recirculating fans cuts heating time and achieves more uniformity . . . Elimination of air and combustion products and introduction of prepared atmospheres prevent scale formation . . . They also reduce scale formed in previous operations.

## Strip Annealing:

**Vertical furnaces permit higher output, better product, less handling.**

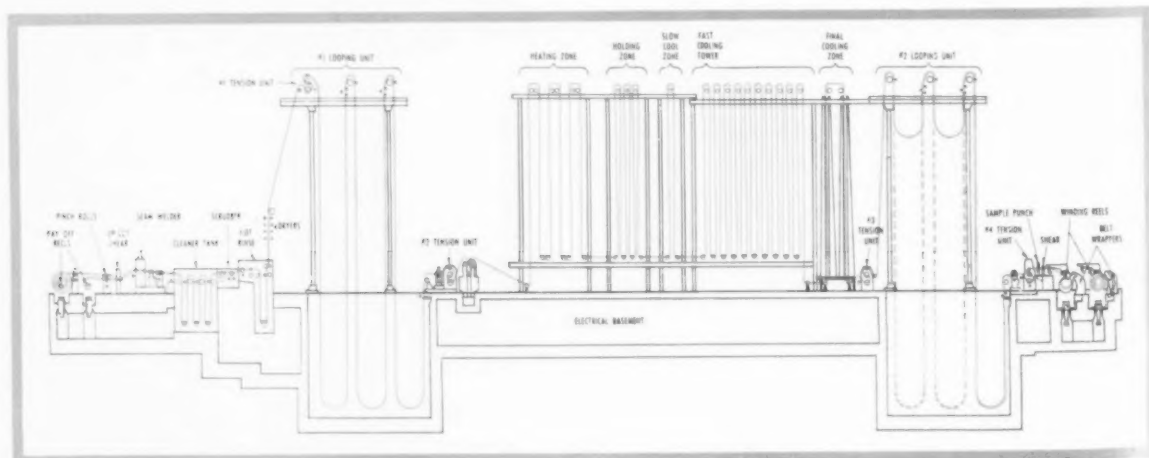
High production, premium quality and low floor space requirements are inherent advantages of continuous vertical annealing furnaces. One major tinplate producer's 321-ft line anneals tin and black plate in thicknesses from 0.0075 to 0.015 in. and in widths from 18 to 37 in. Tinplate with highly uniform physical properties, excellent corrosion resistance and surface condition is produced.

Higher production rates have made closer scheduling possible. The vertical annealing line requires less capital investment, floor space, in-process inventories and handling operations. It consists of an uncoiler, splicer, feeder, cleaner and dryer, heating chamber, holding

chamber, slow and fast cool chambers, and cut-off and coiling devices. Strip speeds as high as 1000 fpm are possible. Production rates are up to 30 tons per hr. on strip 0.010-in. thick and 30-in. wide.

The heating section provides for six passes. Radiant tube elements can operate on coke oven, natural or producer gas. The holding zone, provides for equalization at 1350°F. In the retarded cooling chamber, strip is cooled to 1200°F in six seconds. The final chamber cools the strip to 200°F in water-jacketed ducts. Before recoiling, an open air, blast-cooling section brings the temperature down to 125°F, ready for temper rolling.

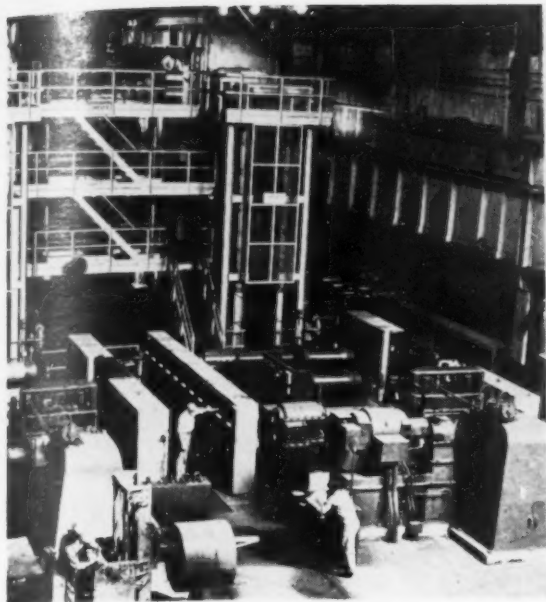
A high nitrogen, protective atmosphere is used in the heating, holding and retarded cooling chambers. This atmosphere produces an absolutely clean strip with a surface that is excellent for electrolytic tinplating.



STRIP ANNEALING on this 32-ft continuous line is at the rate of 30 tons per hr. Speeds as high as 1000 fpm are possible. A high nitrogen, pro-

ductive atmosphere is used in the heating, holding and retarded cooling chambers. The atmosphere produces a clean strip surface.





**SILICON STRIP** is shipped "as finished" directly from these continuous vertical annealing lines. No further strip flattening is required.

## Silicon Strip Tower:

**Line produces strip of required flatness without further processing.**

Two, 10-ton per hr. 42-in. wide continuous silicon steel strip vertical annealing lines have been in operation for five years at a U. S. Steel Corp. plant. Each of the lines gives a total strip length (in protective atmosphere from entrance to exit) of 495 ft, while actual floor space length is only 36 ft.

Flatness, an important factor in laminating material, is far superior to the former process. Material is shipped "as finished" directly from these lines without further processing.

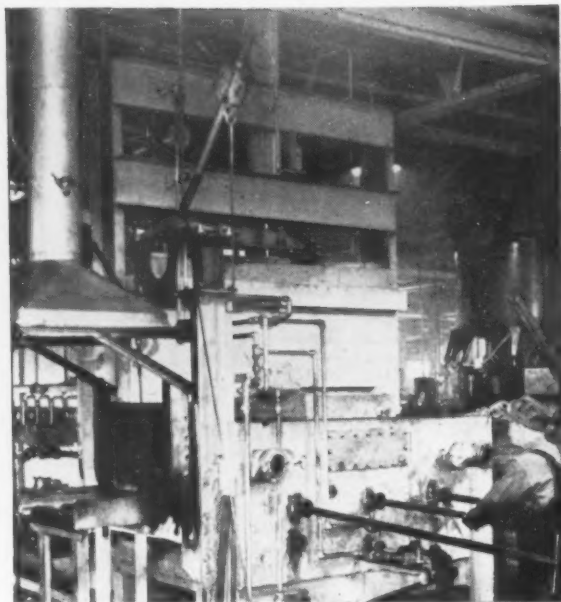
Magnetostriction reduction and secondary recrystallization grain growth are required in these grain oriented silicon steels. They are achieved by applied strip tension during annealing, and holding at temperature of 1750°F.

## Annealing Forgings:

**Furnace processes up to 12 different alloy steels on the same cycle.**

A three row, pusher-type controlled atmosphere furnace is used by an axle manufacturer to cycle anneal forgings. A good machinable structure is obtained in twelve different alloy grades by using only one basic cycle. Three rows of 14 trays each, can be processed through the furnace on the same cycle or varied according to requirements.

The furnace is divided into five automatically controlled zones. If the forgings are scale-free



**ANNEALING FORGINGS** in this controlled atmosphere furnace is done at the rate of 1200 lb per hr. The furnace is divided into five zones.

and clean when charged they will be ready for machining without subsequent mechanical cleaning to remove scale upon discharge. By using the proper atmosphere it is possible to reduce forging scale to achieve good machinability. Capacity of the furnace is 1200 lb per hr. The "all purpose" cycle takes 14 hours to complete.

A rich exothermic atmosphere is maintained in the heating chamber with a dewpoint of 40°F. Only one operator is required and maintenance costs are low.

## Brass Annealing:

**Atmosphere-controlled furnace anneals 8000 lb of coils per hr at 1500° F.**

An electrically heated pusher-type brass coil annealing furnace has increased production, cut costs and improved quality in a New England brass mill. The 900-kw pusher-type furnace is used for finish annealing brass coils up to 26 in. ID x 33 in. OD x 22½ in. wide, weighing 1500 lb.

Equipped with two chambers, it has an annealing capacity of 8000 lb per hr at 1500°F. Coils are pushed through the furnace and cooling chambers on trays. Doors are hydraulically operated and electrically interlocked in correlation with tray movement.

A 10,000 cu ft per hr combustion-type gas generator provides protective atmosphere for annealing. The generator utilizes city gas at 500 Btu per cu ft, and automatically maintains this caloric value.

## Tool Steel Bars:

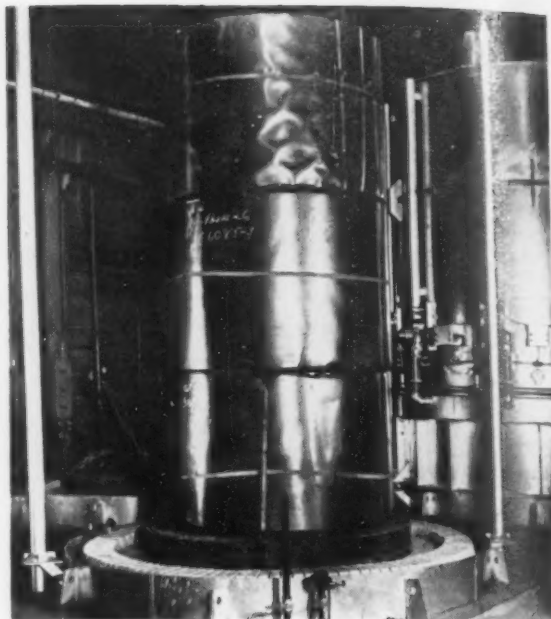
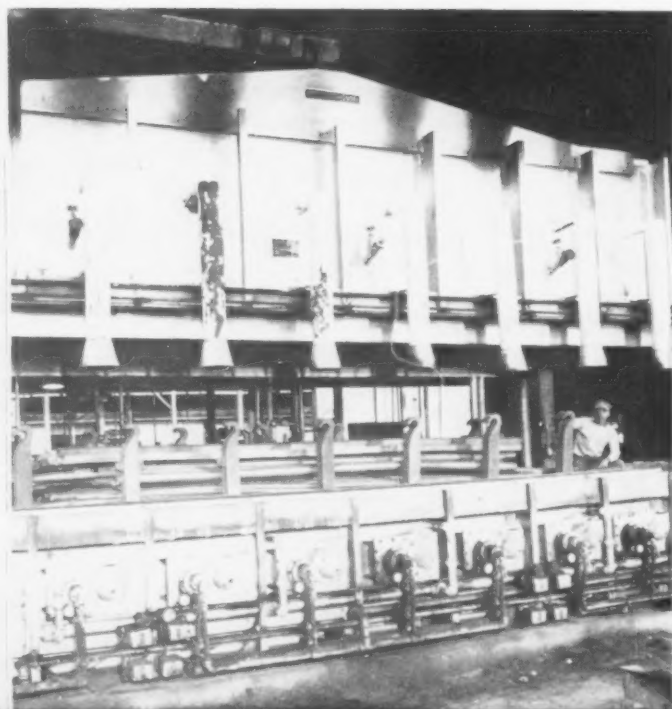
**Hardness control achieves greater uniformity, lowers inspection costs.**

A large tool steel producer is accurately annealing a wide variety of tool steels and restoring carbon where needed on badly decarburized stock in a rectangular bell-type furnace. Hardness controlled accurately throughout any given bar and throughout the load. Inspection costs have been reduced because of the uniformity of the product.

Bars are loaded and annealed without packing or using a muffle resulting in lower labor costs and faster heating time. Different bar orders can be charged together and separated easily after annealing. Mill oxides are reduced to a light, flaky powder, and readily cleaned without pickling of the bars after annealing.

The furnace is gas-tight. A liquid seal is used for closing the space between the base and the bell sections. Heating is by means of gas-fired "U"-type radiant tubes located above and below the load. A special dry atmosphere containing a small percentage of hydrogen and methane is used. It is recirculated through external coolers and dryers to absorb water vapor produced by: (1) Reduction of the rolling oxide on the material being annealed; and (2) Burning of oxygen inside the furnace at the time of closure.

Dewpoint and specific gravity instruments provide a continuous check of the carbon potential of the atmosphere in the bell. This permits modification of the atmosphere to balance carbon content of the various types of tool steels being treated.



**LOW CARBON** coils in stacks as high as 162 in. and weighing 60 tons are annealed in this circular bell furnace. Heating is fast, uniform.

## Low Carbon Coils:

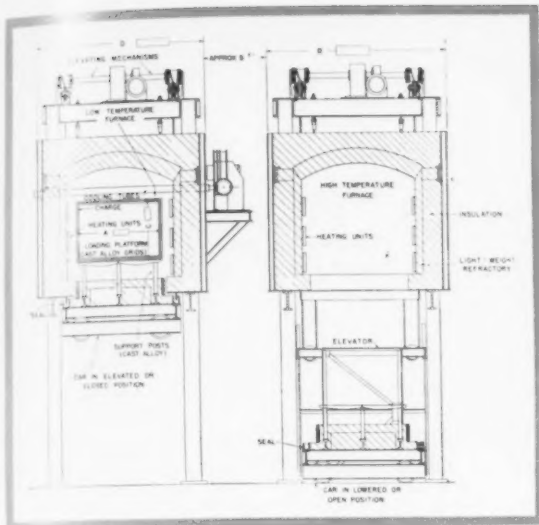
**High-speed atmosphere circulation assures fast, uniform coil heating.**

To anneal low carbon steel coils, circular bell, radiant tube fired furnaces are used by many steel producers. In these furnaces, coils up to 72 in. high, in widths from 30 to 72 in. are annealed in stacks as high as 162 in. and weighing up to 60 tons. High speed circulation of the atmosphere assures fast uniform heating of the coils.

Three bases and one bell usually make up a unit. While one load is being processed the two remaining bases can be loaded or unloaded. Residual heat conserved in the bell permits substantial savings in fuel costs. Gases, circulated by a 15-hp fan, attain speeds of over a mile a minute.

These large furnaces contain special "O" type radiant firing tubes with a heat input of 4 to 5 million Btu, depending on coil diameters and weight of the charge. Rapid convection and high heat permit very short heating and cooling cycles enabling a production rate of 2.0 to 2.5 tons per furnace hr for drawing quality steel.

**TOOL STEEL** bars of a wide analysis range are annealed, and carbon restored on badly decarburized stock, in this rectangular bell-type furnace. Hardness can be controlled accurately throughout any bar or throughout the load. Product uniformity reduces inspection costs.



**BATCH CYCLING** using two, elevator-type annealing furnaces, reduces refractory, fuel, maintenance costs. Short cycles are obtained.

## Batch Cycling:

**Elevator-type furnaces cut refractory, fuel and maintenance costs.**

Two elevator furnaces for annealing malleable castings have gained considerable savings for The Ohio Brass Co., Mansfield, Ohio. The heat retaining design of the furnace shell achieves fuel savings while the lightweight containers, elimination of packing and packing material, have reduced material and labor costs. Refractory life is increased and maintenance reduced by using two furnaces, each maintained at a separate constant temperature level. Floor space is cut one-third to one-half the area formerly required. Short annealing cycles are obtained by switching loads from one furnace to another for cycle changes.

Since the high and low-temperature portions of the annealing time cycle are about the same, two elevator furnaces are used, one for each portion of the cycle.

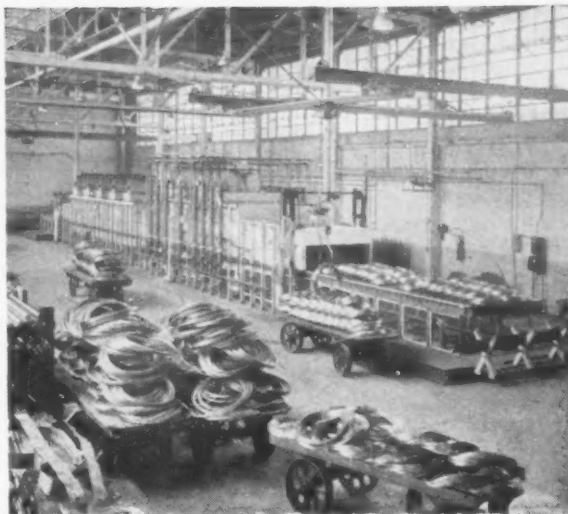
At the end of the high-temperature portion of the cycle, the hot charge is transferred to the low-temperature furnace. The charge is then held at that temperature or slow-cooled at a definite rate. Cooling, equalizing, and holding or slow-cooling are automatically controlled.

## Nonferrous:

**Overdrives and mechanically-operated vestibule doors lower atmosphere loss**

Nickel, silver, phosphor bronze and low zinc brasses for redrawing are successfully bright annealed by one nonferrous producer without the need for subsequent pickling.

Wire coils as well as flatstock in lengths up



**NONFERROUS** producer successfully bright anneals without the need for subsequent pickling in this furnace. Work is carried on driven rolls.

to 15 ft are conveyed through the annealing furnace on 60-in. wide driven rolls. The work is heated rapidly and uniformly to a maximum of 1500°F in a heating chamber containing four large recirculating fans. The water-cooled cooling chamber also uses recirculating fans to cool the work rapidly to 150°F before discharge.

A low dewpoint hydrogen atmosphere protects these alloys against oxidation during the heating and cooling cycles. For low height loads of bar stock, the doors are normally left open. Infiltration of air is minimized by numerous rows of asbestos curtains in the vestibules at both end of the furnace. Higher loads of coil stock are run into the furnace vestibule through the use of over-drive mechanism and the door closed. The work then progresses through the heating and cooling chamber to a point adjacent to the discharge door. At this point over-drive mechanism carries the work rapidly out through the mechanically-operated discharge door. The arrangement of overdrives and mechanically operating vestibule doors at each end of the furnace chamber minimizes atmosphere losses and enables better control of the furnace atmosphere.

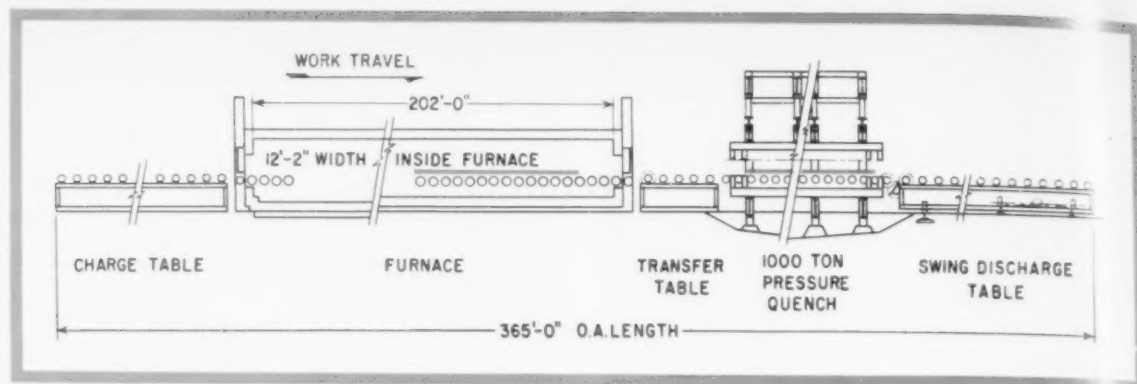
## Stainless Plate:

**Continuous annealing line includes 1000-ton, 42-ft long quenching press.**

A continuous line for stainless, stainless clad and other alloy plate is now being installed by Lukens Steel Co. for heat treating and pressure quenching at temperatures up to 1950°F.

The annealing line includes a 50 ft charge table, a 202-ft roller hearth furnace, and a 1000-ton, 42-ft long quench press. All conveyor rolls, furnace doors and the discharge table swing





STAINLESS PLATE will be produced along with stainless clad and other alloy plate on a new continuous line being installed at Lukens Steel

Co. The annealing line includes a 50-ft charging table, 202-ft roller hearth furnace and a 1000-ton, 42-ft long quenching press.

mechanism are motor operated and controlled by one man from a control house located adjacent to the quench press.

The equipment handles plates up to 130 in. wide, 480 in. long, and 3/16 in. to 2 in. thick, over temperature range of 950 to 1950°F. Heat treating cycles can be varied from 10 min to 12 hrs to handle a wide variety of stainless and other steel analyses. Stainless steel annealing capacity is rated at 13,250 tons per month.

The roller hearth furnace is direct-fired with a combination of natural gas and oil. Temperature control is proportioning and divided into 10 zones of 20 ft each.

The quench press has a capacity of 1000 tons. Work is conveyed in and out of the press by driven rolls mounted on a hydraulically retractable frame which deposits the work on the lower platen while press quenching.

## Investment Molds:

**Higher quality molds processed at 640 lb per hr rate in continuous furnace.**

Higher production and better quality is attained by an investment casting producer through the use of continuous furnaces for heating molds.

Molds 6 in. in diam, 10 in. high, and weighing 16 lb are loaded 10 molds to a tray and pushed 4 trays abreast every 15 min into each furnace. These are processed at 1900°F at a rate of 640 lb per hr. The overall length of each unit is 45 ft. Furnace length is 36 ft 11 in. It consists of a long preheating section and a shorter high heat section.

The trays move on alloy skid rails supported on special refractory tiles which rest on fire-brick piers, forming combustion chambers. Burners fire alternately from the sides of the furnace below the work.



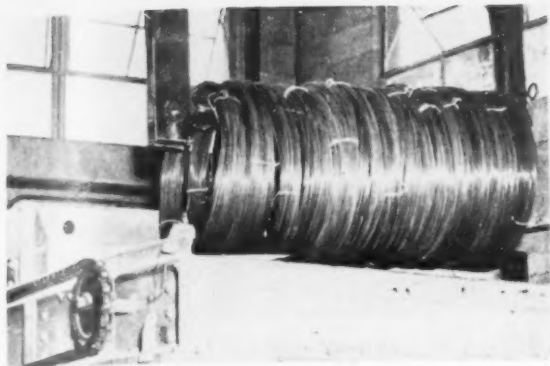
## Salt Bath Annealing:

**Fast, uniform, scale-free heating reduces pickling time from 60 to 15 min.**

Over 100 different shapes and sizes ranging from coiled wire to small stampings are annealed economically at a high rate in an electrically-heated salt bath. The Morse Chain Co., Div. of Borg-Warner Corp., Detroit, anneals wire for cold drawing and heat treats many sizes of steel stampings in a 60 x 57 x 60 in. salt pot. Loads as large as 1200 lb can be annealed from 30 min. to 1½ hr., according to requirements.

This method of annealing has many distinct features. Since molten salt covers the work at all times it is scale free. Because of this, pickling time has been cut from 60 to 15 min. The 15 min pickle is an etch pickle and is done only on wire for better drawing compound adherence. High production rates are possible because the work is in direct contact with the heating medium and heating rates are dependent only on the ability of the work to absorb heat.

INVESTMENT MOLDS are processed at a 640 lb per hr rate in this continuous furnace. Burners fire alternately from the sides of the furnace below the work. Work is carried in trays four abreast through 36-ft furnace.



**SALT BATH furnace, above, permits fast, uniform, heating. Pickling time was reduced from 60 to 15 min. It can take 1200-lb loads.**

## Malleable Iron:

**Heating cycle reduced from 200 to 24 hr in controlled atmosphere furnace.**

Installation of 3-row pusher-type controlled atmosphere malleablizing furnaces has increased the production capacity of black hearth malleable iron in a midwest foundry by a considerable tonnage. These modern continuous furnaces have reduced cycles, previously as high as 200 hr to about 24 hr. Improved quality, lower production costs and less handling were achieved. Elimination of sand or oxide packing makes cleaning by blasting or pickling unnecessary.

Small and medium size castings can be loaded in metal containers to a density of 80

to 100 lb per cubic foot. Roller-equipped trays are automatically pushed on alloy tracks by individually controlled hydraulic cylinders.

Each furnace is divided into 3 cycle sections for heating, holding, and cooling, with eleven independently controlled temperature zones. With continuous operation, over 101,000 lb of clean castings are turned out in a 24-hr period. A protective atmosphere is employed during heating and cooling.

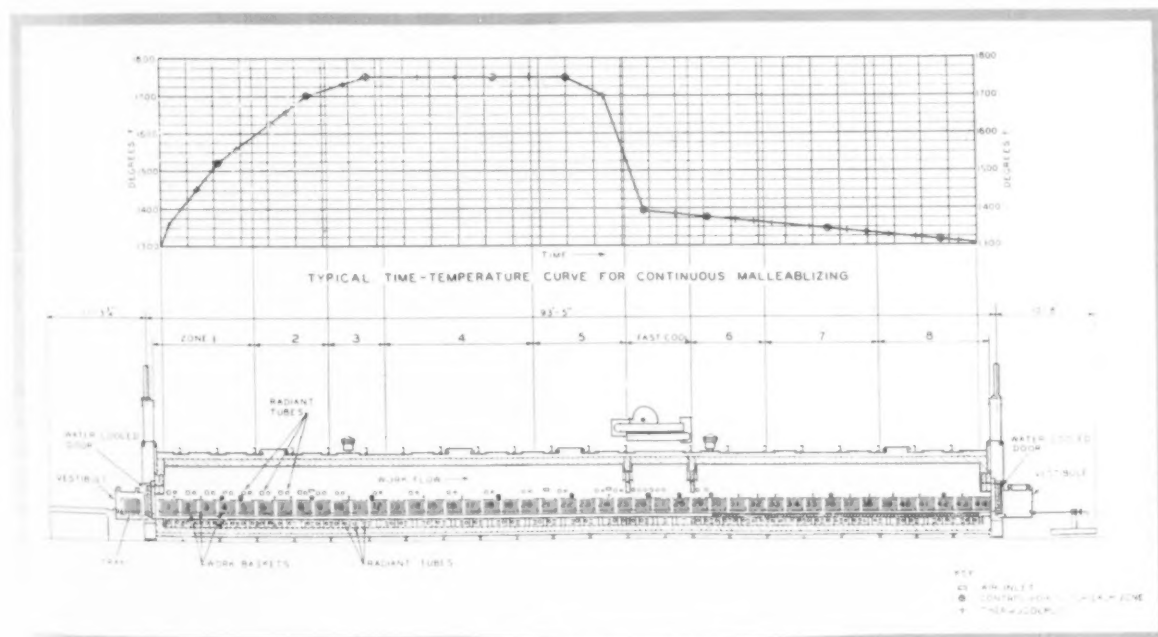
The heating chamber is equipped with gas-fired radiant tube elements above and below the work. The multi-pilot burners are also used in the cooling zones for either heating or cooling. All of the zone temperatures are automatically controlled, making a wide range of cycles possible.

## Bars and Coils:

**Car-type furnaces with lift covers permit less handling, conserve heat.**

Car-type furnaces with lift cover design when equipped with gas-fired radiant tube heating elements and proper atmosphere, efficiently process bar stock which has been decarburized during previous mill processing.

One large steel mill is carbon recovering round, hexagon, flat or square cross-section stock in bars from  $\frac{1}{2}$  to 12 in. diam and coils with overall diameters up to 40 in. Average surface decarburization ranges from 0.005 to 0.032 in. in depth before heat treatment. In a wide range of alloy steels carbon restoration, straight annealing, bright annealing or nor-



**MALLEABLE IRON** capacity of midwest foundry was increased through the use of these 3-row pusher-type, controlled atmosphere furnaces.

Cycling times formerly as high as 200 hr have been cut to about 24 hr. Elimination of sand or oxide packing makes pickling unnecessary.



**BARS AND COILS** are efficiently processed in this car furnace with lift cover design. Gas-fired radiant tube heating elements are used.

malizing can be performed in this furnace.

This design incorporates radiant tubes in the lift cover and in the cars. Each radiant tube is equipped with multi-pilot burners and exhaust eductor which maintain a slight negative pressure in each. Oil or gas fuel can be used. Radiant tubes are also used for accelerated cooling cycles.

The furnace cover is equipped with recirculating fans in the roof arch for uniform distribution of temperature and atmosphere. Two cars coupled together serve the furnace. They move in either direction by a puller arrangement which permits one car to be under heat while the other is cooling to room temperature.

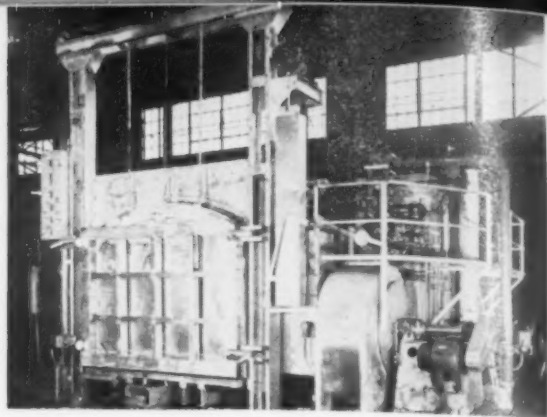
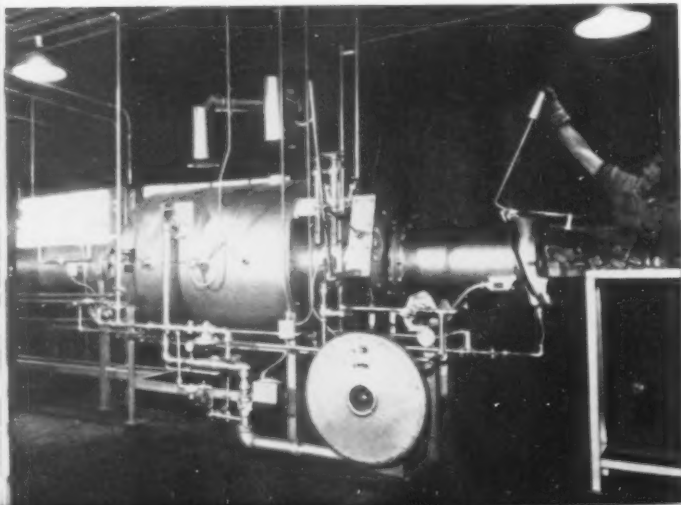
Protective atmosphere is used during first and last portions of the cycle and a reactive atmosphere is used during carbon correction period.

## Stress Relieving:

**External units heat large charge faster in recirculating-type furnace.**

A large recirculating car-type furnace stress relieves castings in charges up to 100 tons at United Engineering and Foundry Co., Canton, Ohio. High production and low operating and maintenance costs are features of this installation.

The furnace consists of a steel encased, insulating refractory-lined heating chamber. The car has a refractory-lined hearth, sand seals, and wheels with anti-friction bearings. The



**STRESS RELIEVING** castings in charges up to 100 tons is done in this recirculating car-type furnace. External units heat charge faster.

underside of the car is ventilated to avoid bearing trouble.

External heaters located along the side of the furnace permit fast uniform heating. Large recirculating fans, used in conjunction with the external heater, circulate the products of combustion to the furnace and back to the heater resulting in uniformity not obtainable by a direct fired furnace.

## Bright Stainless:

**Heavy scale, discoloration avoided in annealing stainless steel components.**

General Metal Products Co., St. Louis, was faced with the problem of bright heat treating several deepdrawn stainless steel components for a large valve used in stainless steel beer barrels.

Attempts to anneal stampings with an existing furnace resulted in heavy scale and discoloration making costly and difficult pickling operations necessary. In addition, the bright finish desired in the completed pieces was never obtained.

With a new gas-fired, full-muffle hydrogen atmosphere furnace, the company is now processing scale free parts with the required finish at a considerable cost saving. This pusher-type furnace contains purging chambers at both charge and discharge ends and an automatic purging water-jacketed cooling chamber with controlled water temperature.

Production was increased to such an extent that it was possible to use open furnace time to help customers with problems on furnace brazing, bright annealing of 300 stainless steels and bright hardening of 400 series stainless steels. Savings were also made in the company's scale-free annealing of many straight carbon steel stamping jobs.

**BRIGHT STAINLESS** finish was obtained on deep drawn stainless parts with this gas-fired, full-muffle, hydrogen atmosphere furnace.





# Sintering Brazing

**P**ROGRESS in brazing and sintering has been in the direction of automatic handling, automatic atmosphere and temperature control so operators merely load and unload . . . New designs capitalize on mechanized handling . . . Atmosphere-tight furnaces maintain low dewpoints for bright brazing and heat treating stainless and titanium alloys . . . They also permit economical use of costly inert rare atmospheres . . . Modern sintering furnaces achieve heating uniformity within close temperature ranges for good size control . . . Brazing and hardening combined in one furnace mean less handling, improved quality.

## Stator Blades:

**Double muffle furnace produces high strength powdered metal parts.**

Over 10 million powdered metal parts have been produced without a material failure in a double muffle pusher-type electric furnace at Tapco Div., Thompson Products, Inc., Cleveland. Blades have a minimum tensile strength of 100,000 psi.

Production of these blades requires a sintering and an infiltration treatment. They are fixtured for both operations in alloy racks for infiltration

of a molded copper powder block which is placed on the root of the blade.

Accurately controlled non-metallic heating elements provide high uniform temperatures. Work loaded on trays is pushed into the furnace from a conveyORIZED loading table. The trays are pushed one against the other through the furnace on a continuous predetermined time cycle, and through a cooling chamber toward the exit door where they are discharged.

Functioning with either an oxidizing or protective atmosphere, this furnace is well suited for brazing, sintering, infiltrating, annealing, and many other heat treating operations.

## Stainless Parts:

**Small parts processed faster in gas tight furnace with raised hearth.**

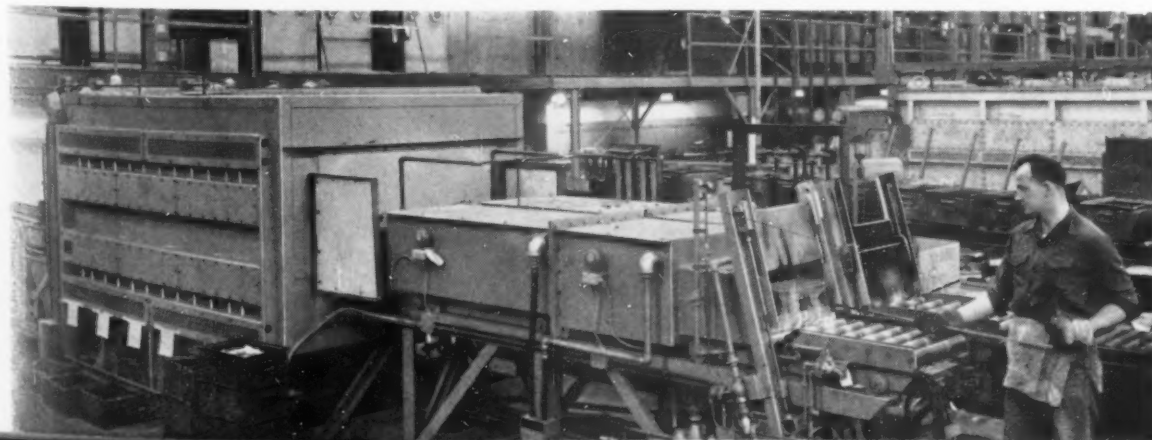
Bright copper brazing and bright heat treating of titanium alloys and stainless steel are done in a unique gas tight atmosphere furnace whose hearth is located well above the entrance and exit openings. At least two aircraft companies are using this furnace for processing small

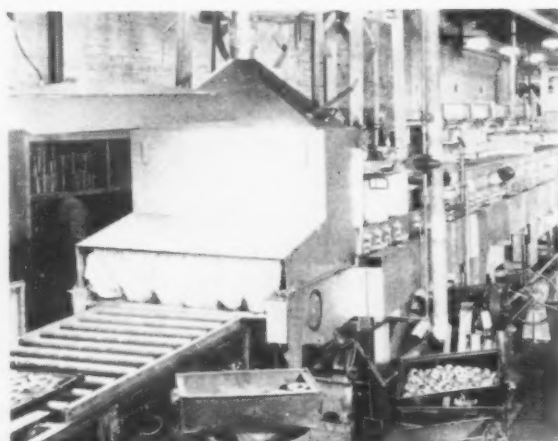
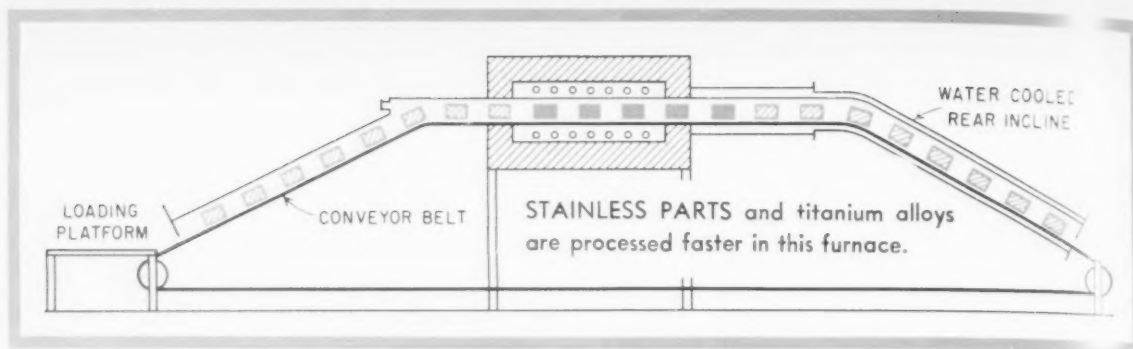
parts. A similar furnace is used for degasifying radio and TV tubes. (See cut, top of next page).

A continuous belt for handling materials through this electrically heated furnace reduces labor costs. Because the atmosphere is contained in the elevated hearth, dew points as low as  $-50^{\circ}\text{F}$  can be maintained easily. Atmospheres primarily used are hydrogen or dissociated ammonia. Argon or helium can also be economically used when heat treating titanium or stainless. The furnace is electrically heated.

STATOR BLADES are loaded into this double muffle, pusher-type electric furnace. Double muffles give furnace twice the production ca-

capacity in half the space required by two single muffle furnaces. The furnace is well suited for brazing, sintering and annealing.





**LARGE COMPACTS** are sintered at a rate of 950 lb per hr in this electrically heated furnace. Tight furnace shell eliminates need for muffle.

## Large Compacts:

**Tight furnace shell eliminates high cost muffle, reduces maintenance.**

High production and flexibility are important features of a 105 ft long electrically heated sintering furnace. The heating chamber, 21 ft wide and 30 ft long, makes it possible to heat uniformly at a high rate. The cooling chamber is approximately twice the length of the heating chamber and adequately cools the work before leaving the furnace. The furnace shell is gas tight and since no muffle is required an important maintenance problem is eliminated. This furnace will sinter 950 lb of iron compacts per hr.

## Gyroscope Parts:

**Hydrogen atmosphere permits bright brazing of stainless without flux.**

Savings in material, labor and floor space are achieved at the Sperry Gyroscope Co., Great Neck, N. Y., by the use of a continuous belt-type, electrically-heated furnace. The company used a straight hydrogen atmosphere or a nitrogen-hydrogen mixture for bright copper brazing of stainless parts without the use of fluxing materials. A flux is used for bright silver brazing.

## Research:

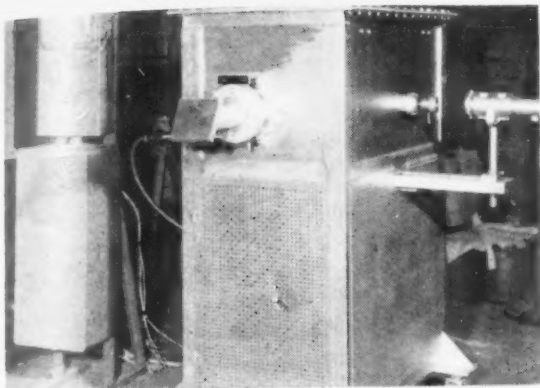
**Automatically controlled 5000° F furnace accurately duplicates results.**

A carbon resistor tube furnace is now being used for the production of carbides and silicides. It is also being used in many research laboratories for the development of a wide range of ceramics, metallurgical materials and glasses. The furnace is automatically controlled. Temperatures range up to 5000°F. Processes may be identically repeated under electronically controlled



**GYROSCOPE PARTS** made of stainless are bright-brazed in this hydrogen atmosphere, con-

tinuous furnace without need for fluxing materials. [Flux is used for bright silver brazing.]



RESEARCH laboratories can use this carbon resistor tube furnace, capable of temperatures up to 5000°F. Test results can be duplicated.

conditions, insuring duplication of any favorable results.

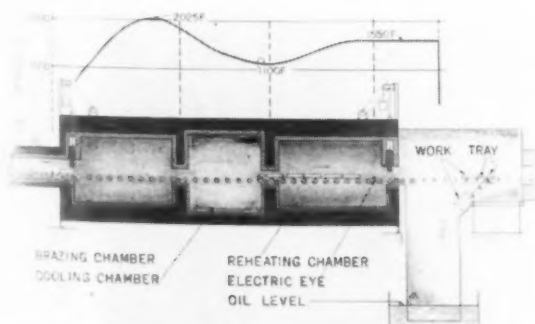
The resistor tube is inexpensive and easily replaced. Tube life depends directly on the average operating temperature. The tube maintains a carbon atmosphere at all times. An inert atmosphere must be continuously introduced into the furnace to prevent oxidation of the carbon tube. Purified argon, helium, or nitrogen may be used.

## Tank Track Links:

**Three zone, roller hearth furnace combines brazing and hardening.**

Brazing and heat treating are done in one furnace by the Burgess-Norton Mfg. Co., Geneva, Ill. By using a three zone roller hearth furnace this company copper brazes and hardens tank-track links in one operation. Production is five times greater than that of a former furnace without any increase in personnel. Quality has improved and substantial reduction in costs are effected from the elimination of handling operations.

In copper brazing, twelve to sixteen trayloads of assemblies per hour pass in a continuous train through the equipment. In the brazing chamber,



TANK TRACK LINKS are brazed and heat treated in this three zone, roller hearth furnace. Handling between operations is eliminated.

the work reaches about 2025°F. It then moves slowly through a cooling chamber where it is lowered to 800-850°F for transformation below the critical temperature of the steel. In the reheating chamber, the work is raised to about 1550°F and soaked preparatory to quenching for hardening. Parts emerge from the furnace bright and shiny due to the use of a low cost exothermic atmosphere.

The entire operation is automatic. Intermediate handling between brazing and heat treating is eliminated. Trays and work are only partially cooled after brazing. They retain about half the heat required for the hardening treatment. Trays, rolls and heating units have long life, resulting in low maintenance cost.

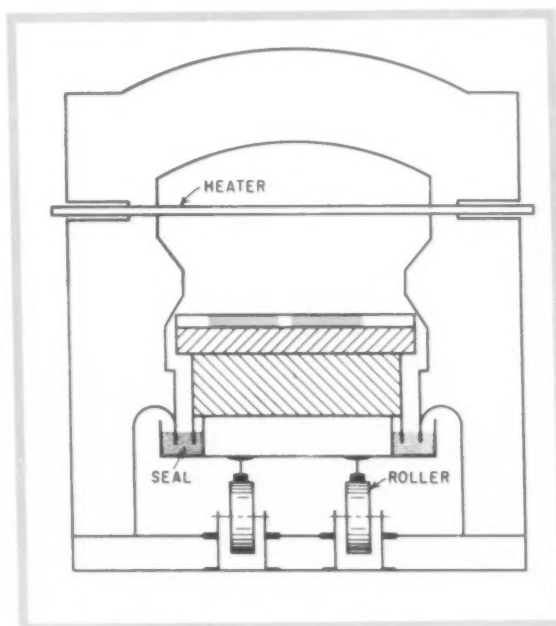
## Metal Powders:

**Electric rotary hearth furnace treats 100 lb of metal powders per hr.**

An electrically-heated rotary hearth annealing furnace has increased production of metal powders for one producer to the point where several batch operations are no longer necessary. Previously, small batches of powder were run through long cycles with resultant high labor costs. With the rotary furnace, 100 lb per hr production is maintained, at a lower cost in labor and material.

The 200-kw furnace processes the powders through 5 zones. The first zone preheats the material to 1472°F in 30 min, the second, third, and fourth zones heat and soak the powder at 2370°F.

The furnace is a doughnut-type rotary furnace with a hearth centerline diameter of 18 ft.



METAL POWDERS are annealed at 100 lb per hr in this electrically-heated rotary hearth furnace. Powder is processed through five zones.





# Lower Temperatures

- Drawing
- Descaling
- Oxidizing
- Solution Treating
- Core Baking

CONVECTION heating, a modern approach to uniform heat distribution, imparts equal heat to work regardless of section thickness . . . Many furnaces now incorporate cooling areas so finished work can more easily be handled . . . Vertical furnaces treat long pieces with less warpage, save floor space . . . Steam drawing imparts unusual surface features: Improved lubricating properties, longer life for high speed steel tools . . . Salt bath descaling saves metal, removes scale quickly, reduces disposal problem . . . New type core baking ovens mean cleaner working conditions, faster and more uniform drying at less cost.

## Automotive Parts:

**Conveyorized furnace draws parts of varied section to uniform hardness.**

Tight hardness ranges are being met with a recirculating continuous draw furnace in the manufacture of steering knuckles and other automotive parts having marked differences in cross section at a plant of a leading automobile manufacturer. This furnace has a slat type

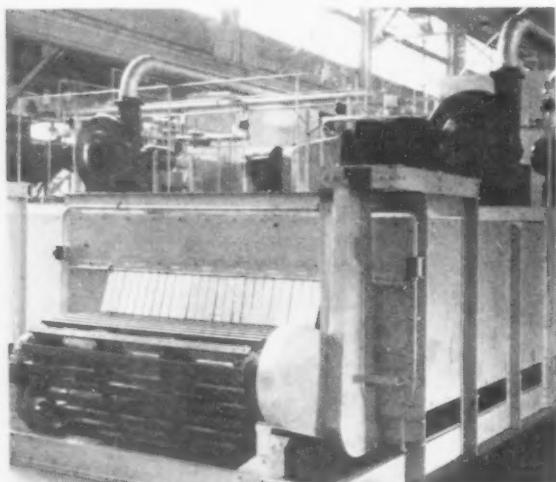
conveyor belt. It operates between 300°F and 1300°F.

The high velocity recirculating, counter-flow furnace eliminated the need to compromise on hardness because work heated more rapidly and uniformly and the thinner sections did not lead much in heating. Because no temperature head is used the thinner sections never become hotter than the thicker sections in the holding zone. At no time can any section become hotter than the control setting.

## Fasteners:

**Continuous belt furnace draws 600 lb per hr to close hardness limits.**

Reduction of heat treating scrap losses and maintenance of close hardness tolerances are among benefits of new draw furnaces at a



AUTOMOTIVE PARTS are held to tight hardness range in recirculating continuous draw furnace. Various size sections are heated evenly.

fastener manufacturing plant. An installation of six continuous draw furnaces at Shakeproof, Inc., Div. of Illinois Tool Works, holds hardness tolerance limits within 5 points RB or less. And this Elgin, Ill., plant now reports heat treating scrap losses of less than 1/2 of 1 pct.

The furnaces at this plant have a 3 1/2-in. load height, each belt is 18 in. wide and heating chambers are 13 ft long, with a 7 1/2-ft cooling area. The air is heated in a separate combustion chamber above the furnace. High velocity, high pressure air enters the furnace chamber through the side walls of a distribution chamber below the perforated hearth plates. The hot air passes through the work on a wire mesh conveyor belt returns through the perforated arch into a collecting chamber, then to the combustion chamber.

Each furnace is equipped with an electronic flame control circuit operating a manually reset safety shut-off valve. Furnaces are vibrator hopper fed and can temper 600 lb of parts per hr. Hoppers on the vibrator feed are fed by means of metal trays which are delivered by a roller conveyor to elevators servicing that particular furnace. Trays are automatically lifted to hopper level, dumped, and returned for refilling.

## Steel Parts:

**Automatic box furnace draw quenches, oxidizes and bright draws steel.**

A new, combination draw-quench unit, designed for both bright, scale-free tempering and controlled oxidation from 400° to 1400° is being used on stampings and small parts. It is a fully automatic, sealed unit with the heating chamber separate from the combination cooling chamber and quench tank.

Parts being treated do not contact air at any time; work that has been previously bright hardened remains clean and scale-free. The controlled endothermic atmosphere also permits oxidation or blue tempering within strictly controllable limits.

At the end of the heating cycle, work auto-

matically moves to the quench rack, allowing another work tray to be loaded immediately into the heat zone. The tray rack holds work for atmosphere cooling, or lowers it for oil quench.

For controlled oxidation or blueing, a predetermined quantity of water is admitted automatically into the furnace during a part of the heating cycle. The water vaporizes, forming the oxidizing atmosphere. The amount of water, oxidation time and temperature are all automatically controlled by presettings on the control panels to obtain the exact thickness and desired chemical makeup of the oxide.

Heating is primarily by forced convection from electric elements in the hearth below the load. Temperatures of the sealed quench and cooling zone are controlled automatically. Circulating oil provides any combination of slow, moderate, or drastic quench.

## Cast Iron:

**Steam drawing replaces chemical dip treatment to improve lubrication.**

Steam drawing has replaced a chemical surface treating operation for obtaining special lubrication properties on cast iron parts in a plant of an automotive parts manufacturer. This company also treats its high speed steel tools in this manner with a resultant increase

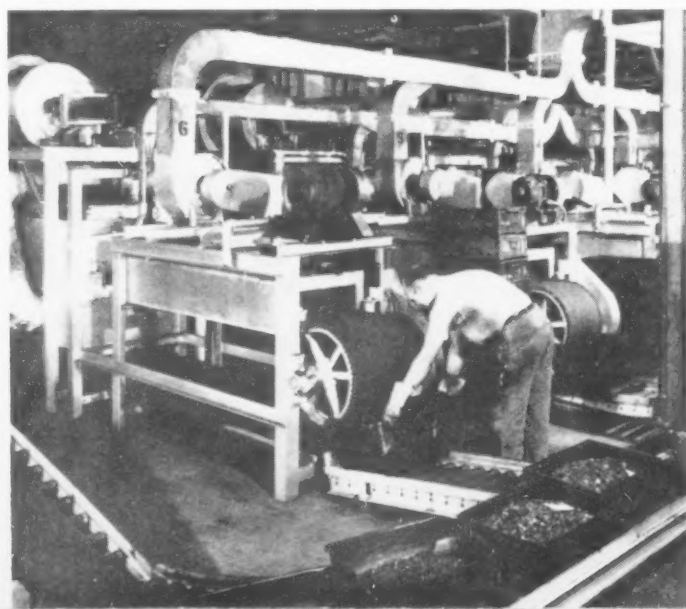
in tool life of from 50 to 75 pct before regrinding. Putting the furnace right in the production line cuts handling costs sharply.

The furnace is first brought to 700°F with air, then held at this temperature for a half-hour while steam at 1150°F is injected to purge air from the work chamber. The load is then heated to soak temperature and held for a specified time, with steam flowing through the furnace. At the end of the soak, work is either air-cooled or quenched in soluble oil.



◀ **CAST IRON** parts and high speed steel tools are steam drawn in this unit. It replaced a chemical treatment to improve iron lubrication.

**FASTENERS** in various sizes and shapes are treated in these draw furnaces to close hardness tolerances. Rejects are under 1/2 of 1 pct. Units are hopper fed, will handle 600 lb per hr.



## Aluminum Sheet:

**Elevator furnace heats and quenches 5000-lb of aluminum automatically.**

Perhaps the fastest way to solution treat aluminum sheets with the least distortion is in elevator furnaces. This type of furnace is set well above the floor, the quench is beneath the floor. These units have replaced other designs in many plants of top aluminum fabricators. Other advantages: Aside from saving floor space, the fact that the furnaces opens only on the bottom saves heat.

The furnace is electrically heated, uses forced air circulation for fast uniform heating. A typical unit takes load carriers up to 5 ft wide by 40 ft long and 10 ft high, with loads up to 5,000 lb. It is charged at floor level by rolling a loaded carrier onto a rack which is then raised into the furnace by a hydraulic piston.

When heating time is up the load can be hydraulically lowered into the quench and fully immersed in 6 to 8 seconds. Limit switches and control valves can be set to control the entire cycle automatically.

## Extruded Shapes:

**Vertical unit handles long sections in aluminum without twists and bends.**

Warpage is reduced and consistent quality obtained by heat treating aluminum extrusions in vertical furnaces. Extrusions 16 to 24 ft long weighing up to 2000 lb are heated to 970°F then quenched vertically in a tank below the furnace. This type furnace uses very little floor space in relation to the amount of work it can

handle. Previous to this it was practically impossible to quench these long pieces without a great amount of twisting and bending of the sections.

The furnace, of insulated dual panel construction is heated by recirculated air from an electrically heated chamber at its base. Extrusions are raised into the furnace by a drum and cable hoist which also lowers them into the quench pit.

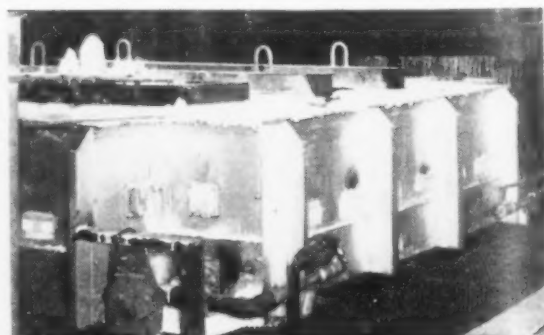
## Strip Descaling:

**Salt bath descales steel and titanium with fewer rejects, lower total cost.**

A large strip mill uses a continuous salt bath designed for descaling stainless or titanium strip up to 52 in. wide and from .018 to .095 in. thick. Speeds vary from 20 to 75 fpm with an immersion length of 22 ft. Maximum production of hot strip is 9½ tons per hr, with a speed of 20 fpm on 0.095-in. and 40 fpm on 0.45-in. thick material. The heat saving under these conditions is 45,000 to 50,000 btu per ton.

When descaling cold strip, the speed is reduced to heat the material to bath temperature and allow 15 sec to 1 min at bath temperature for the descaling reaction. From the hot caustic bath, the strip passes thru a cold water spray wash, a weak acid bath, a hot passivating rinse, then to the recoilers. Elimination of reworking and rejects has cut costs substantially.

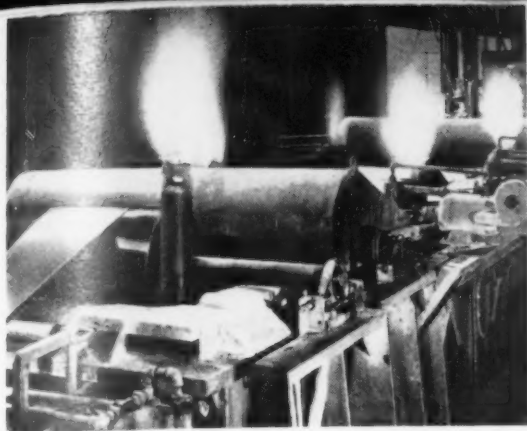
Gas-fired immersion tubes (see cut) 6 in. O.D. heat the salt. Special burners have been developed to provide uniform heating throughout the immersed length of the tube. Temperature is automatically controlled and burner capacity of 3,000,000 btu is divided into three temperature control zones.



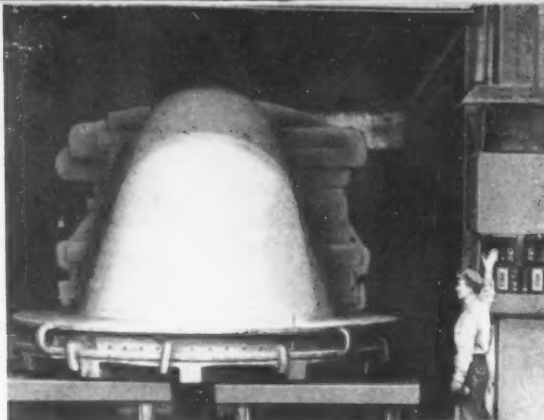
**WIRE DESCALING** is a batch process in this salt bath furnace. Water quench removes salt and scale. Company reports no metal loss.

◀ **EXTRUDED SHAPES** can be treated with minimum warpage in this unusual vertical furnace. The quench, beneath the floor, is in foreground.





**STRIP DESCALING** line uses continuous salt bath on stainless steel and titanium strip, either hot or cold. Gas-fired immersion tubes heat it.



**LARGE CORES** in Pittsburgh district foundry are baked in two-car oven with 100-ton capacity. Car arrangement is fast, economical, flexible.

## Wire Descaling:

**Batch salt bath cleans steel wire in coils uniformly without metal loss.**

A batch type salt bath is efficiently descaling high speed, alloy and carbon steel at Universal-Cyclops Steel Corp., Bridgeville, Pa. The company reports better, more uniform scale removal with no loss of metal. Less space is required than with acid removal. The process is fast and the problem of waste pickle disposal is minimized.

Coils of wire or rods are processed through this batch equipment by supporting them on a rack, then submerging in the bath for a short period. The work is then quenched in water for removal of salt and loose scale. This is followed by a dilute acid pickle and a high pressure water spray.

The equipment consists of a kettle for holding the molten metal or salt, and steel encased refractory-lined combustion chambers adjacent to the side walls of the kettle.

## Large Cores:

**Two-car type baking oven is flexible, economical in large steel foundry.**

Flexibility, economy and speed are features of a two-car type core baking oven in use at Pittsburgh Steel Foundry, Glassport, Pa. Capacity is 100 tons per charge. Flexibility is derived from use of the two motor-operated cars which have tracks running parallel to each other. One large core can be loaded using both cars or two loads of smaller cores can be charged for two different drying times.

Heated with gas or oil, this equipment operates at temperatures of 600° to 800°F. The hearth is 18 ft wide and 32 ft deep with the opening 15 ft high. The door is motor operated and opens practically to full height of the furnace. Fast uniform drying is accomplished by circulation of hot air.

## Small Cores:

**Vertical conveyor oven speeds output, improves foundry working conditions.**

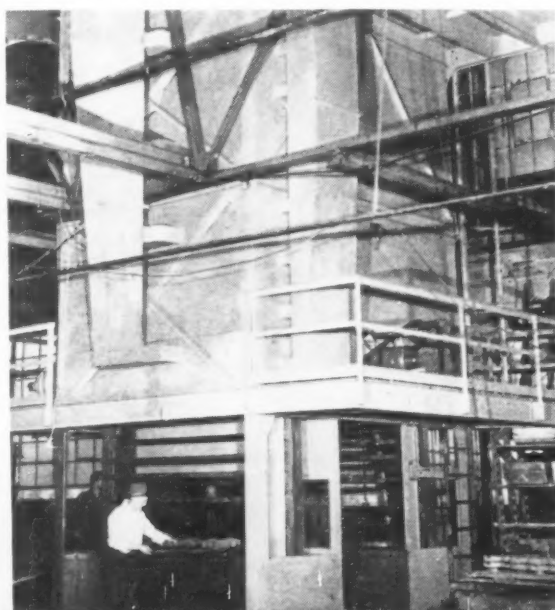
A vertical conveyor core oven installed at the G & C Foundry Co., Sandusky, Ohio, has speeded production and improved working conditions. Baking capacity of two tons of cores per hr is accomplished in a floor space 9 ft 6 in. by 11 ft 5 in. The oven is 36 ft high and extends into the floor to a depth of 10 ft.

Cores are loaded on carriers suspended on two continuous chains which travel up one side of the oven and down the other. Cores are loaded at a comfortable working height and unloaded on the opposite side of the oven.

The heating system is of the recirculating horizontal cross flow type and the combustion chamber is sealed in to prevent the combustion products from entering the oven.

A cooling chamber at the exit side of the oven allows cooling of the cores for better handling. Because the oven is of the vertical type, the oil fumes from the heated cores do not enter the work room.

**SMALL CORES** are baked in vertical oven using minimum floor space. It has boosted output and improved working conditions in an Ohio foundry.





# Enameling Galvanizing

**B**BETTER heat control in modern batch galvanizing furnaces reduces spelter loss, extends pot life and cuts maintenance costs . . . More uniform coatings, better adherence and high production are achieved . . . Continuous enameling furnaces with elevated, electrically heated hearths permit cleaner heating conditions in the firing chamber . . . Rejects due to surface defects are lowered . . . "U"-shaped conveyor system cuts power costs, reduces warpage on enameled parts . . . Incoming work is preheated by outgoing pieces.

## Water Tanks:

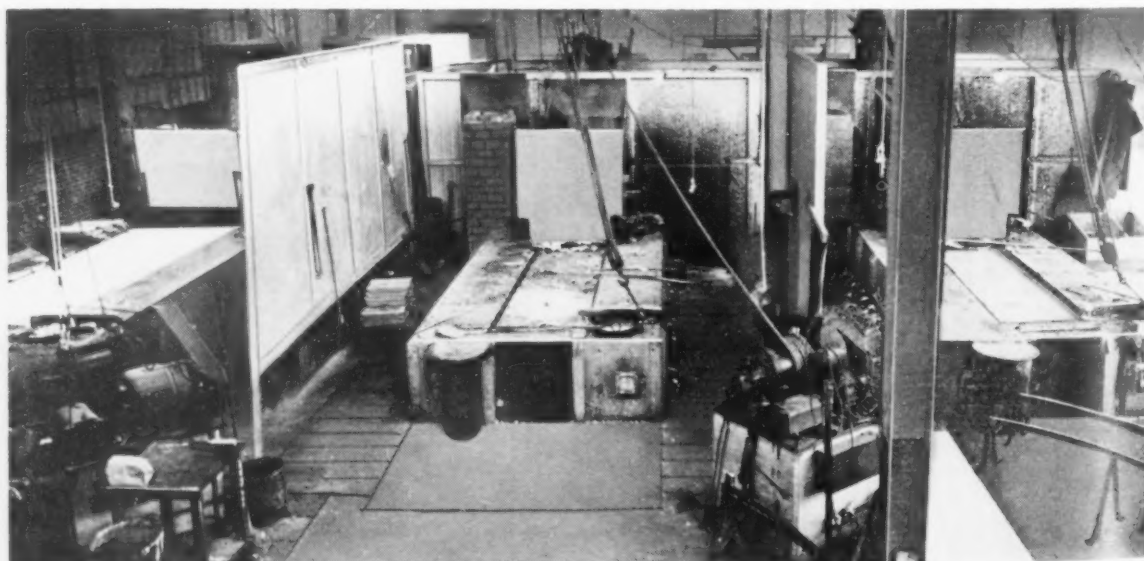
**Less dross formation, higher quality obtained with better heat control.**

Installation of three modern, high-side, gas-fired galvanizing units has resulted in higher quality, low dross and greater output at John Wood Co., Conshohocken, Pa. The company manufactures automatic water heaters, range boilers and tanks.

The company found the close control and even heating of the gas-fired units were the important factor in improving the quality of the galvanized work while reducing dross. A pre-heat chamber,

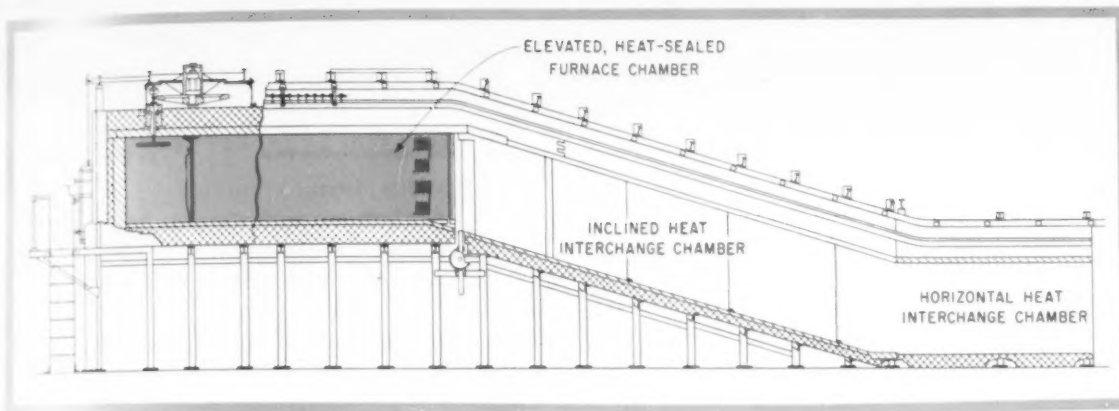
which uses exhaust heat from the galvanizing furnace, dries the work prior to galvanizing. Two of the units are 3 x 12 x 3½ ft. The third has a kettle 4½ x 18 x 3½ ft.

All the burners are used for full production. For light loads only one set of burners for each zone is needed. These burners are equipped with pilots and used primarily for keeping the spelter in a molten condition while the furnace is idle. Temperatures are automatically controlled by electronic instruments operating in conjunction with air-gas proportioning valves. The design prevents flame from striking the kettle. It also permits the use of a low-temperature head between the combustion chamber and bath.



**WATER TANKS** galvanized in gas-fired galvanizing pot have a better adhering, more uniform

coating. Exhaust gas from furnace dries work. (Temperatures are automatically controlled.)



KITCHEN SINKS and other enameled products are fired in this elevated-hearth, electrically-heated furnace. "U"-shaped conveyor design

permits preheating of incoming work by outgoing enameled pieces. Elevated firing chamber reduces convection currents, lowers heat loss.

## Kitchen Sinks:

**Outgoing work preheats incoming work on "U"-shaped conveyor system.**

Porcelain enameling of kitchen sinks and other enameled products at Kaiser Metal Products, Bristol, Pa., is done with elevated-hearth, electrically-heated furnaces.

This furnace has been widely accepted for enameling because of its ability to provide clean heat at low operating costs.

The U-shaped conveyor design allows incoming pieces to be gradually heated by outgoing pieces.

This lowers power costs and reduces warpage by slowly preheating the work. The elevated firing chamber reduces convection currents, thus minimizes heat loss and down dust circulation.

Multiple circuits of electrical heating elements provide even heat distribution for accurate and rapid temperature control. Because the furnace atmosphere is not contaminated by fuel gases, rejects are appreciably lessened.

Since muffles are not required with these electrically heated units, the furnaces can be brought up to operating temperature in about six hours. Firing zones can be sealed off by brick doors to allow maintenance in other sections without cooling them down.

## Lamp Bases:

**Doors at both ends of ceramic furnace permit faster loading and unloading.**

Clean furnace conditions are a must in the firing of many ceramic products. An electric kiln used in the manufacture of ceramic lamp bases overcomes rejects due to foreign material in the furnace work chamber. A wide range of work can be done in this modern, box-type furnace. An automatic cycle controller controls temperatures and heating times. Operation of the fur-

nace includes heating from 350° to 400°F for 3 to 4 hr for drying. The temperature is then gradually increased to a firing range of 1850° to 2250°F. After 12 hr firing time the furnace shuts off and cools slowly to 900°F. The work is then removed and allowed to cool to room temperature.

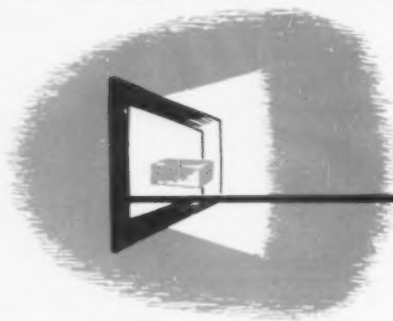
After the glaze coat is applied bases are again placed in the furnace and fired at 1200°F. After firing the bases are slow cooled to 900°F and air cooled to room temperature. Ornamentation is applied and the bases refired at slightly above 1200°F and slow cooled. For easier handling the furnace is equipped with doors on both ends.

**LAMP BASES** in this electrically-heated kiln are handled faster because of doors at both ends.

Cycles are controlled automatically. (Foreign material in work chamber is reduced.)







# Heating

## for Hot Forming

- Soaking
- Reheating
- Forging

**M**ANY new forging furnaces use recuperators to give faster heating and to cut fuel cost by as much as 25 pct . . . Use of convection heating is expanding. Where temperatures permit—as in heating aluminum—indirect gas firing avoids overheating, reduces rejects . . . Electrically heated forging furnaces with protective atmospheres give fine, close-to-tolerance finishes on forging blanks . . . Protective atmospheres in any furnace reduce scaling of steel, lengthen die life . . . Built-in materials handling devices integrate furnaces with forge operations, mean less time and heat loss.

### Steel Ingots:

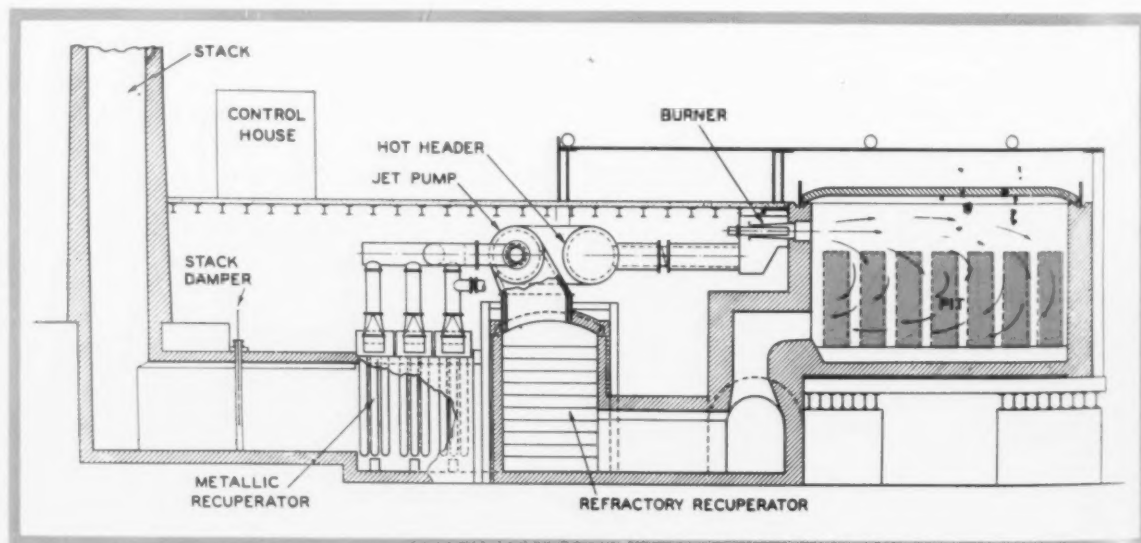
**One-way fired soaking pit heats 16 ingot tons per hour.**

With increasing openhearth production, a midwestern steel mill found its old soaking pits inadequate, capacity output nonuniform and quality poor. It installed new one-way fired pits with a recuperative system. Using 490-Btu coke oven gas and maintaining average charges of 80 tons of ingots per pit, average production of 16 tons an hour was maintained. Quality of

the bloomed slabs and finished steel has improved and fuel costs per ton are lower.

This pit uses a single burner in one end wall. It fires across the top of the ingots, with the hot products of combustion doubling back in a horseshoe pattern to be exhausted near the pit bottom through ports in the same end wall.

After leaving the pit, the hot gases pass through recuperators where they give up a lot of their heat to the combustion air being piped to the burners. The burners will handle coke oven, blast furnace, natural or producer gas, or mixtures of these as well as oil or tar.



STEEL INGOTS come from this modern soaking pit at 16 tons per hr, with average charge of 80

tons, using 490-Btu coke oven gas as its fuel. Heating control is completely automatic.

## Railway Car Wheels:

**Doughnut-shaped unit heats big billets to 2150° F at rate of 33 tons hourly.**

An automatic furnace charger and an automatic furnace unloader are separate, self-contained units, each with its own drives and switch gear. The furnace has a rated capacity of 200 billets per hour, or 23,000 lb at 2250°F.

Billets for forging into car wheels, ranging from 14 to 20¼-in. diam and from 9½ to 26⅞ in. long, are heated at the rate of 33 tons per hr to 2150°F in a rotary hearth furnace.

In this furnace the track drive is fastened to the hearth and the hearth drive wheels are

mounted on the structural framework beneath the furnace. This gives jolt-free billet travel through five zones of automatic temperature and combustion control. The hearth is driven at diametrically opposed points by 10 hp differential-type drive units using two pinions that engage a rack fastened to the outer circumference of the hearth. An automatic charging mechanism loads the furnace in accordance with the hearth travel, while the discharge machine is equipped with a platform from which an operator controls the peel and tongs movement.

The furnace can be either gas or oil fired. Combustion gases pass counterflow to the travel of the billets and are flued at hearth level.

## Steel Slabs:

**Pusher type furnace's 27 burners heat 70 tons to 2300°F per hour.**

As part of a huge expansion program, a Chicago area steel company recently installed a pusher-type slab heating furnace to heat 70 tons of steel slabs per hr to 2300°F.

The slabs, measuring 7 in. thick x 30 in. wide x 15½ ft long, are charged sideways into the furnace by a mechanical pusher and are pushed in a continuous line through primary and sec-

ondary heating zones. A total fuel release of 180,000,000 Btu per hr is attained from 27 oil-fired burners.

A needle-type metallic recuperator is arranged so that flue gases enter the recuperator at the top, pass over the outside of the elements, and are discharged from the bottom of the recuperator to the stack. Gases enter the recuperator at about 1400°F. With waste gas temperatures ranging from 1200° to 1600°F, air preheat is from 700° to 890°F. When waste gas temperatures run up to 1800°F, air preheat temperatures of 1150° are commonly obtained.

## Crankshafts:

**Automatic rotary hearth furnace heats 23,000 lb of steel billets per hour.**

High quality automobile crankshafts are now produced automatically by a continuous press forging process at Chrysler Corp. Dodge Forge Plant, Detroit. Forging production has tripled that of former methods.

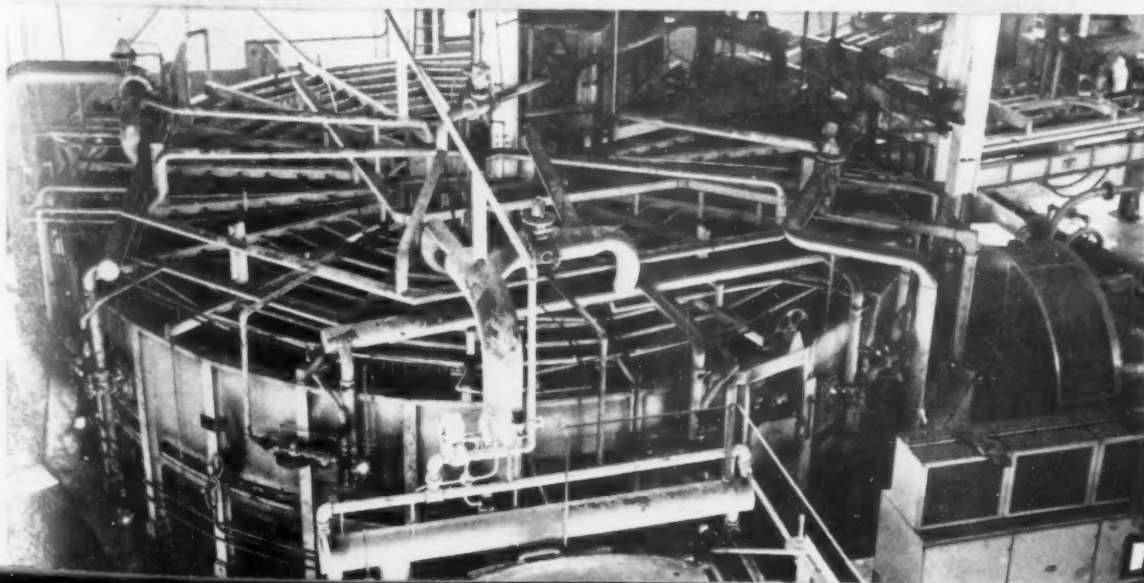
A 30-ft automatic rotary hearth furnace is used to heat the billets which are formed into cranks by subsequent operations. The furnace

is heated by 15 dual fuel burners. Ten of the burners fire into the chamber from the outside wall and the others from the center wall. The burners, which are started on gas, are fired ordinarily by oil. The furnace is divided into four heating zones and three temperature control zones, and is equipped with automatic pressure and combustion control. The one unfired zone utilizes the counterflowing exhaust gases for preheating the stock.

The number of increments of hearth travel between charging and discharging is adjustable by means of a selector switch.

**CRANKSHAFTS** are heated for forging in this 30-ft diam automatic rotary hearth unit which

has increased forging production by 200 pct. Setup includes automatic charger and unloader.



## Hot Heading:

### Screw producer uses hopper feed, fast localized heating for flexibility

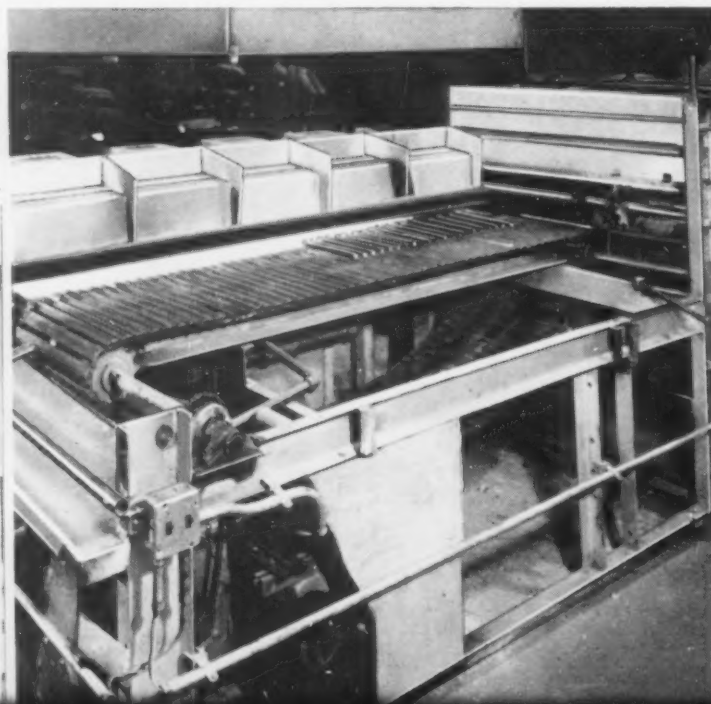
For accuracy in hot heading carbon and alloy steels at Chicago Screw Co., Bellwood, Ill., a continuous feed forge furnace having fast localized heating characteristics has provided consistent temperatures and flexibility in the sizes of work handled. In this operation bars are fed from the bottom of a hopper and automatically placed on a multiple strand conveyor belt by notched positioning wheels. Accurate spacing of the bars assure a constant flow of a consistently heated length throughout the entire production run. This has increased production and quality.

The furnace can be set at predetermined rates of speed and temperature and controlled automatically, eliminating the human factor. Heating time is varied by changing the speed of the conveyor. Bar sizes beyond maximum length of the hopper can be hand charged directly onto the conveyor belt.

The hopper on the Chicago Screw unit holds a 30 to 60 min supply, depending upon bar diameters. A positioner compensates for the length of bar stock being processed.

A counter can be placed near the hopper end of the conveyor to give an accurate check on the flow of the work. If production requires it, the length of the hopper can be increased to handle sizes on a continuous basis.

**HOT HEADING** stock is heated locally in this hopper-fed continuous furnace. Accurate spacing gives constant flow of consistently heated bars.



## Jet Engine Parts:

### Small rotary units heat without scale for high temperature forging.

For cleaner, more perfect forgings, and at the same time maximum die life, small rotary hearth forging furnaces are being used in large numbers. A protective atmosphere with transparent curtain burner at the open door keeps out air and prevents scale from forming on the billets or reheats. The elimination of scale permits coining to a fine finish, even when forging at high temperatures.

This rotary hearth forging furnace is electrically heated with metallic elements for lower temperatures and silicon carbide resistors for temperatures above 1900°F. The operator can readily adjust the hearth speed for the proper heating time. Automatic temperature control, and recording of the work temperature permits uniform results on all parts.

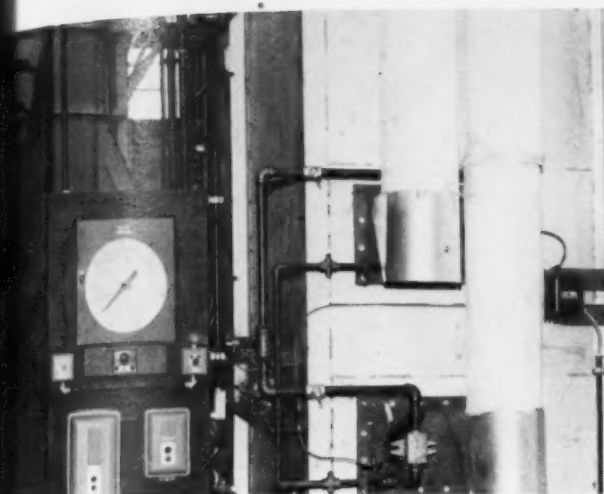
Standard size furnaces for capacities up to 1500 lb per hour and temperatures to 2500°F are available. Operator convenience and speed are effected by setting the hearth height at the level of the die. A water cooled flue over the door opening shields the operator from the hot furnace gases and compact design keeps floor space requirements down.

The silicon carbide resistors receive their power through variable output transformers. Two or three output circuits on each transformer allow adjustment of the heat input for maximum flexibility. Power consumption is low due to the high grade insulation and the fact that the hearth rotates inside the furnace and does not have to be reheated.

**JET ENGINE PARTS** benefit from small rotary hearth furnace heated by silicon carbide units. Protective atmosphere prevents billet scaling.







**ALUMINUM BILLETS** of better, more consistent quality are heated to 1000°F in indirect gas



fired convection unit. Billets move on rollers. Doors at each end make handling easier.

## Aluminum Billets:

**Indirect gas fired convection unit protects against overheating stock.**

Indirect gas fired, convection type furnaces are effecting considerable savings in the forging of aluminum billets. Due to the furnace design production has been increased and because the billets are protected from overheating by the convection principle the quality is better, and more consistent.

Billets 14 x 20 in. are placed on rollers mounted on the 8-ft hearth and heated to 1000°F at the rate of 1000 lb per hr.

For easier handling, the unit has two doors at one end of the furnace and one door at the other end. A louvered metal shield at one side and at the top of the furnace insures uniform distribution of hot air from the heating chamber through the furnace. Heating is by radiant tubes located in a separate heating chamber. The air is circulated by a fan located above the furnace.

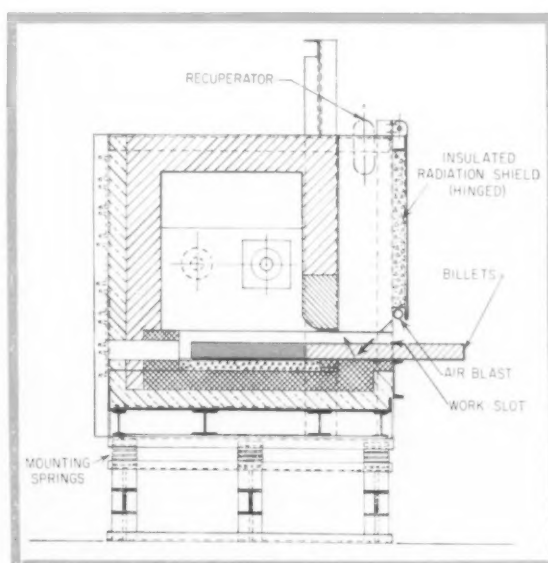
## Forging Aluminum:

**Spring mounted slot type furnace cuts shock for longer refractory life.**

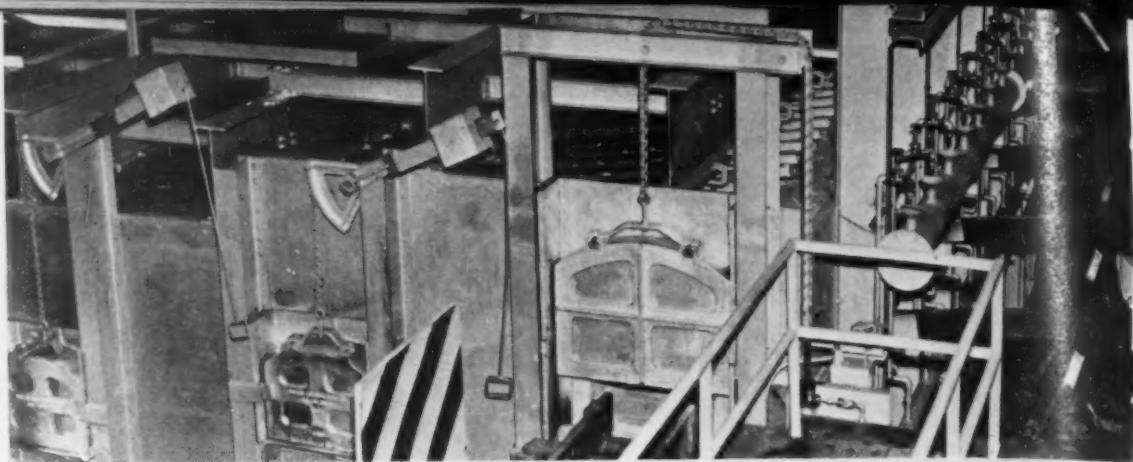
Improved quality and working conditions, less rejections and higher productions at lower cost are possible with a spring mounted slot furnace for forging aluminum billets. This furnace is lined with insulating refractory and utilizes a recuperator in the heating system to save from 20 to 25 pct of fuel over older box

type furnaces. Recirculation of products of combustion or air along with accurate temperature control makes for higher uniformity.

The forehearth and sidewalls are extended beyond the front walls of the furnace, this along with an air blast curtain makes working conditions more comfortable for the operator. Because the furnace is spring mounted it is possible to install the temperature control instruments on the furnace itself. Lessening of shock and vibration to the furnace also increases refractory life.



**FORGING ALUMINUM** billets is specialty of this slot type furnace. Recuperator in heating system saves 20 to 25 pct of fuel once wasted. Spring mounting lessens vibration.



**LONG BILLETS**, up to 30 ft in length, are heated in this new pusher type unit in a midwestern steel

plant. Unit is rated at 60 tons per hr. Double-pass recuperator preheats combustion air.

## Long Billets:

**Recuperative design of pusher unit boosts heating efficiency, saves fuel.**

A new pusher-type billet heating furnace that heats 2½-in. square steel billets, 30 ft long, at a rate of 60 tons per hr to 2300° F, was installed recently by a midwestern steel producer. The billets enter the furnace through a door opening in the sidewall adjacent to the pusher mechanism. They are then pushed sideways through the end of the furnace to a mill delivery table.

There are 13 burners in the discharge end,

arranged for one zone automatic control. The dual fired burners will handle either natural gas or Bunker "C" fuel oil and generate 75,000,000 Btu per hr.

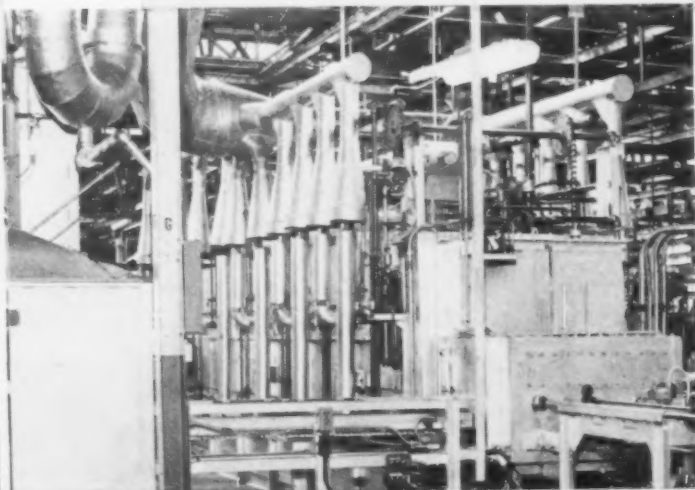
A metallic, double-pass recuperator preheats combustion air to temperatures from 700° to 1000° F, utilizing the heat in the flue gas. The recuperator is arranged in two sections. Air is forced through the first section, directed through an insulated housing into the second section, and then through an insulated air header back to the furnace where it is mixed with fuel for the burners. Heating efficiency as well as fuel economy are substantial benefits from this recuperation arrangement.

## Converter Shafts:

**Automaker increases production 128 pct with integrated automatic treating unit.**

An automaker has increased production 128 pct with an integrated automatic heat treating unit. The previous method required several furnaces and as many men in the hardening and drawing of torque converter shafts. Now one man heat treats 128 pct more shafts with better surface quality and physical properties.

**CONVERTER SHAFT** output at an auto plant was boosted 128 pct by this integrated unit. A fog cooler, left, cools work for easier handling.



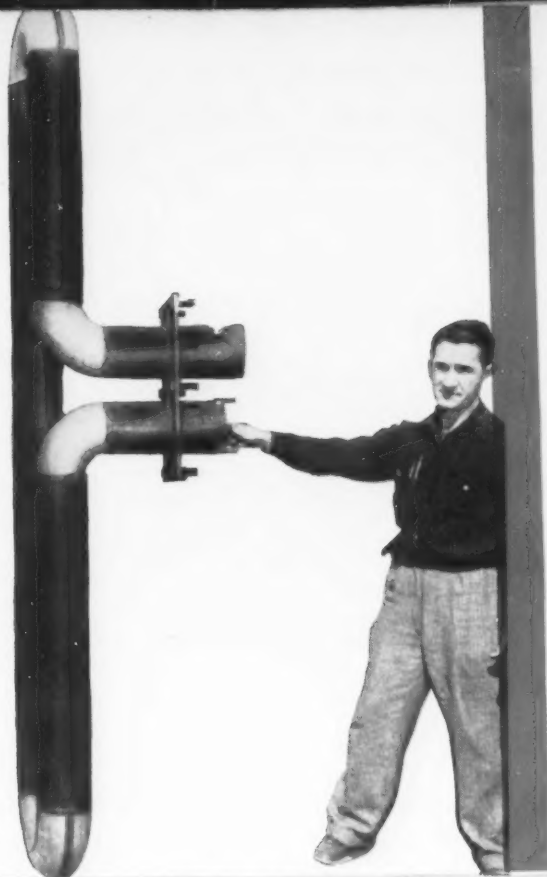
The unit consists of a two-row pusher type hardening furnace, quench tank, washing and rinsing unit, draw furnace and a fog cooler. The latter cools the work to room temperature for easier handling. The various pieces of equipment are placed in a modified circle so that the finished work reaches the point of original loading. One operator loads and unloads the work from the same position.

Operation of the furnace is controlled by one pushbutton. The operator loads two trays of shafts on the conveyor, pushes a button which opens the charge door and starts the work into the furnace. At the same time a finished load of two trays comes out of the fog cooler for unloading. All of the heat operations are under protection of atmosphere.

### Want Extra Copies?

A limited number of extra copies of this special feature will be available upon request to Readers' Service Dept., The Iron Age, 100 E. 42nd St., New York 17, N. Y.

# here's the amazing "O" tube



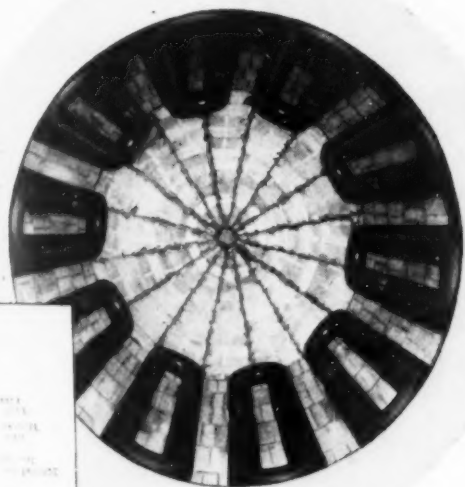
**that reduced annealing costs**

The remarkable efficiency of the Lee Wilson Single-Stack Portable-Base Annealing System is due in a great degree to the new "O" type radiant tube. The tube, developed by Lee Wilson especially for the bell type furnace, is an engineering accomplishment.

The design of the tube allows greater length of flame travel and the fuel application is so arranged that the principal heat release is in the bottom of the tube. The flame, however, is continued around the top elbow, changing the direction of the gas flow, keeping the primary combustion near or on the tube surface, effecting more efficient heat transfer. The sharp turns designed into the tube not only make it a compact, space-saving unit but create a gas turbulence at the elbows that promotes more rapid combustion; thus, more of the tube is working. The "O" Tube has a much greater dispersion area than other tubes and can operate at an input of 500,000 BTU per tube, per hour.

The design of the tube also permits perfect blanketing of inner cover, speeding heating time and eliminating hot and cold spots. Structurally, the tube has the advantage of not requiring holes in the furnace arch and but one opening in the side wall. It is free to expand in every direction, preventing excessive force which might crack the joints.

There's a lot more to the story! Performance records prove this tube has no equal when it comes to quality production annealing. It's the furnace of the future — here today. Brochure and data sheets available upon request.



*Lee Wilson*



**ENGINEERING COMPANY, Inc.**

20005 WEST LAKE ROAD, CLEVELAND 16, OHIO



# So Easily Installed... TO GIVE YOUR FURNACES A GUARANTEED HEAT SOURCE!

## "FOLDED-and-FORMED" HEATING ELEMENTS

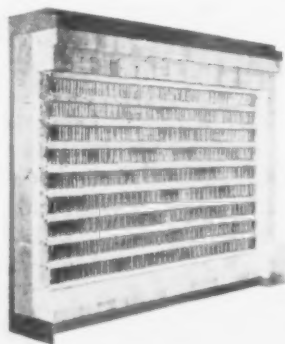
STANDARD, CUSTOMBUILT  
OR "KNOCK-DOWN" RACKS

### Electric Heat With a Guarantee

Quickly, easily installed in furnaces, ovens, kettles, etc., of any size or shape. No intricate wiring or inside connections.

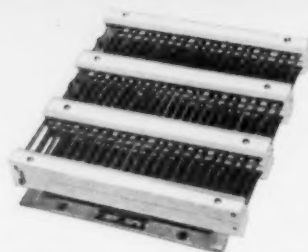
*Unequalled heat source for quick rise to temperature; long-life efficiency; minimum maintenance and repairs.*

Available in a wide range of sizes and variety of combinations, to fit any flat or curved area, or arranged in banks to provide maximum K. W., and temperatures to 1850°F.



Above can be supplied either as complete shell or furnace wall; or elements and porcelain retaining bars can be furnished for application by customer, as described at right.

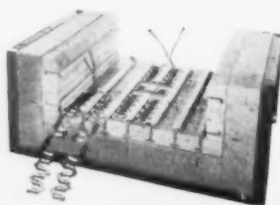
Write for booklet completely describing "Folded-and-Formed" Heating Elements; their ease of application; and why furnaces equipped with "F-and-F" units have such outstanding advantages.



"Folded-and-Formed" Heating Elements in Standard Rack, size 12" x 12" . . . the unit of a thousand-and-one applications. Installed vertically or horizontally, and used in series, arranged side-by-side, end-to-end or in banks, to meet K. W. requirements. Guaranteed five years, at temperatures up to 750°F. or 1350°F.



"Folded-and-Formed" Heating Elements in cylindrical annealing furnace. Furnished as complete jacket to customer's specifications, ready to install around vacuum retort.



Illustrating the application of "Folded-and-Formed" Elements in "knock-down" form, for floor and walls of furnace. Elements are furnished in rows of required length, with slotted porcelain retaining bars which customer anchors into refractory floor and walls. Element rows slide easily into position between the grooved porcelain bars.

**TRENT INC.**

Electrically Heated Industrial Equipment  
243 LEVERINGTON AVE. PHILA. 27, PA.

In Canada: Supreme Power Supplies Limited, Toronto 14

## Heat Treating

### Atmospheres:

**How furnace atmospheres are made and controlled.**

The normal atmosphere of a furnace is atmospheric air containing approximately 20 pct oxygen plus, in the case of direct fuel fired furnaces, varying quantities of carbon dioxide, water vapor and carbon monoxide.

Oxygen, carbon dioxide, and water vapor have a great affinity for metals at high temperatures. They combine with the metal to form oxides (scale) and with the carbon in steel to form carbon monoxide and thus deprive the steel of its surface carbon (decarburization).

### Use Special Atmospheres

To avoid these bad effects specially prepared furnace atmospheres have been developed. These exclude the objectionable gases and substitute for them gases that are neutral, reducing, or carburizing to metal parts at high temperatures.

Along with the development of these atmospheres has gone the development of gas tight, electric furnaces, and gas tight fuel fired furnaces from which the products of combustion of the heating source are excluded through the use of radiant tubes, retorts or muffles. Gas generating equipment is available to provide the wide range of gas analyses required to meet practically all heat treating requirements.

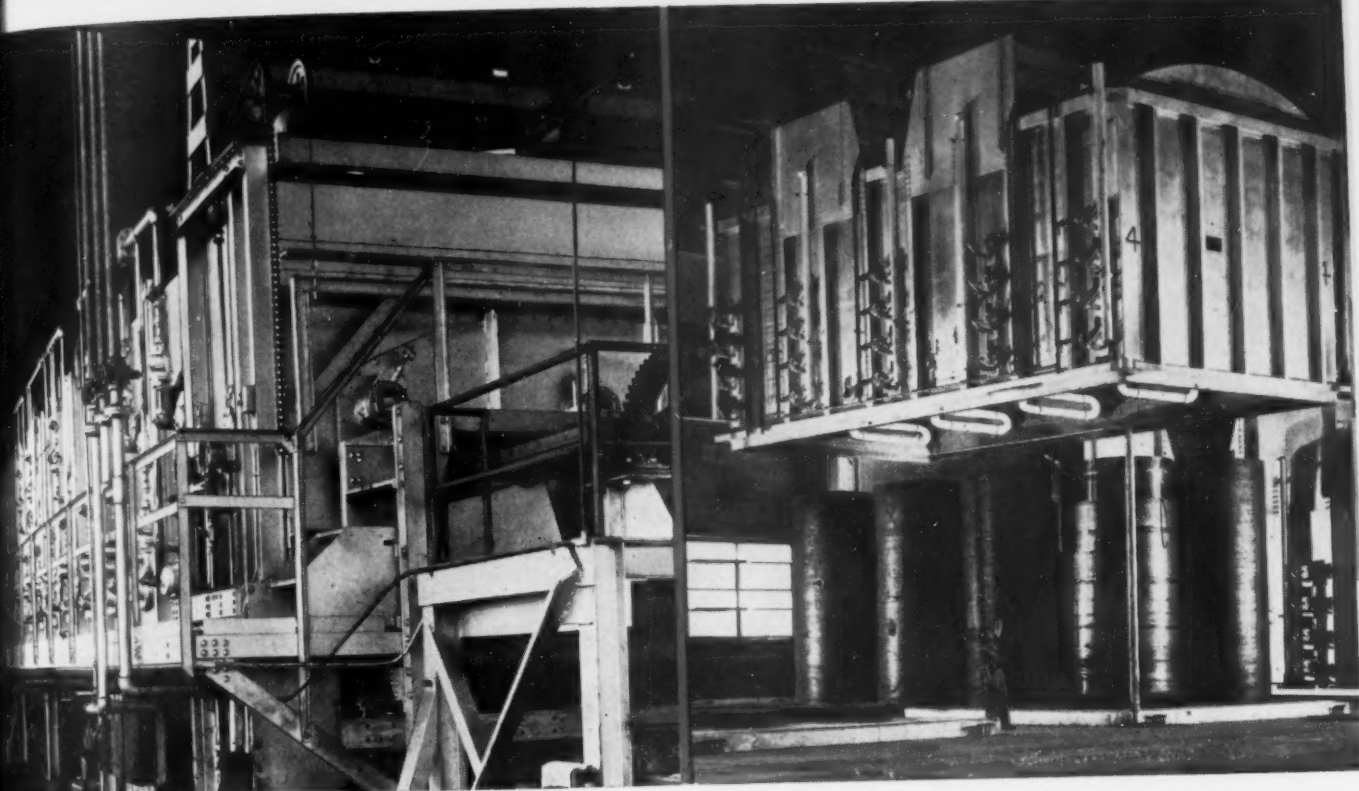
### Exothermic Gas Cost Low

The most widely used gas among the readily available protective atmospheres is exothermic gas. Raw materials such as coke oven gas, natural gas, propane or butane are universally available and the cost is low. Exothermic gas is produced by the partial combustion of a hydrocarbon gas in the presence of a catalyst. Properties of the gas can be varied by varying the air-gas ratio.

A rich exothermic gas, that is, one containing 15 to 18 pct hydro-

Turn to page F-38

# Modern INDUSTRIAL FURNACES



... for the heat treatment  
of **ALUMINUM**

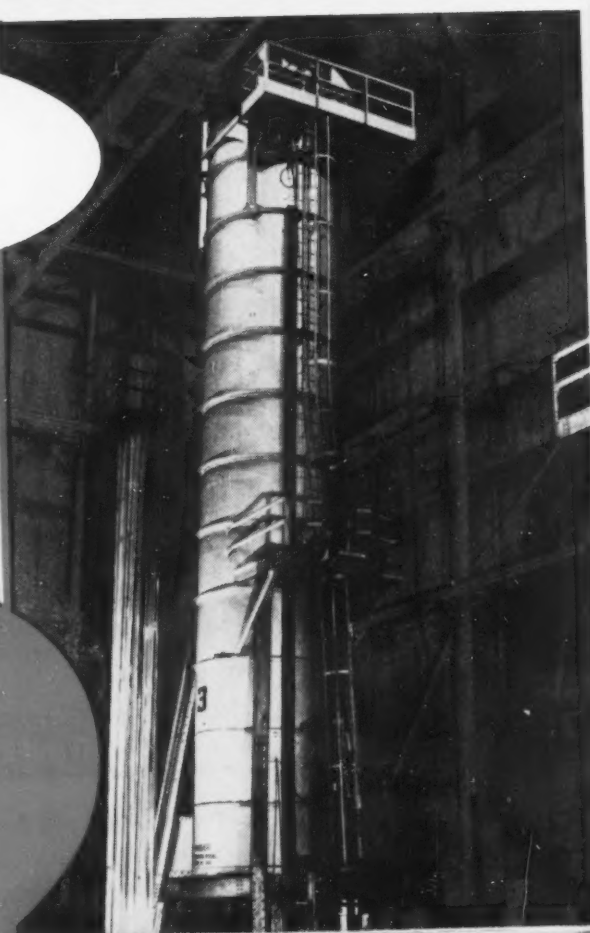


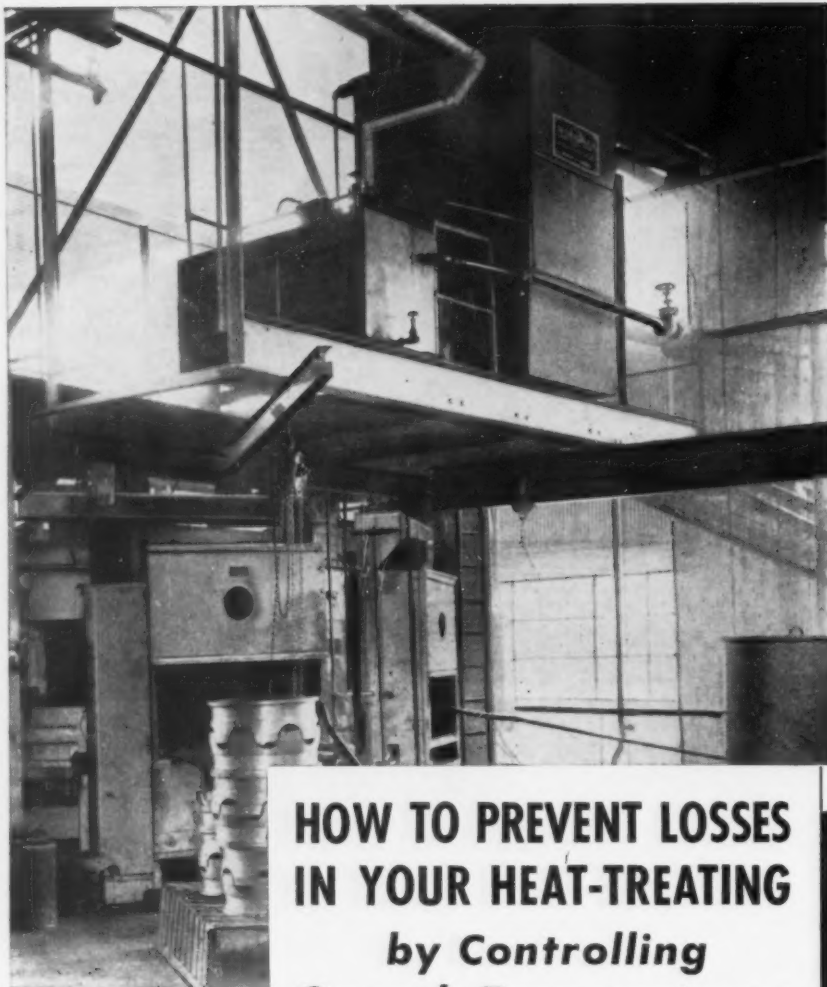
**WINDELL-DRESSLER**

Corporation

Designers and Builders of Modern Industrial Furnaces

PITTSBURGH 30, PA.





## HOW TO PREVENT LOSSES IN YOUR HEAT-TREATING by Controlling Quench Temperatures

● Using Niagara's AERO HEAT EXCHANGER to cool your quench bath never fails to give you real control of the temperatures at which you wish to quench.

Your experience will be the same as others who have installed this method. You'll get better physicals; save losses and rejections; increase heat-treating capacity and production with lower costs. You can put back heat into the quench bath to prevent the losses of a "warm-up" period. You remove heat at the rate of input and prevent flash fires in oil quench baths.

You'll save space in your heat treating department and get a more productive arrangement because less room is needed for coolers and tanks. You'll find savings in piping, pumping and in the amounts of oil you will have to buy. And the saving in the cost of cooling water alone is enough to repay the cost of the Niagara Aero Heat Exchanger, usually in less than two years.

*Write for Bulletin 120 and further information*

### NIAGARA BLOWER COMPANY

Dept. IA, 405 Lexington Ave.

New York 17, N. Y.

*Niagara District Engineers in Principal Cities of U. S. and Canada*

INDUSTRIAL COOLING  HEATING • DRYING

**NIAGARA**

HUMIDIFYING • AIR ENGINEERING EQUIPMENT

## —Furnace Atmospheres—

gen, 10 to 13 pct carbon monoxide, 4 to 5 pct carbon dioxide, 1 pct methane, and a dew point of approximately 70°F is widely used for bright annealing, sintering, and brazing low carbon steel. A surface cooler using city water will in most cases reduce the dew point of the gas to a sufficiently low value.

### Bright Annealing Copper

A lean endothermic gas, that is one containing only traces of hydrogen and carbon monoxide is required for bright annealing copper. Reducing gases cause embrittlement of copper.

All exothermic gases decarburize medium and high carbon steels since they contain two active decarburizers, water vapor and carbon monoxide.

The two most widely used protective atmospheres for heat treating medium and high carbon steels without decarburization are: (1) Purified exothermic gas; and (2) Endothermic gas.

Exothermic gas is purified by removing the carbon dioxide and most of the water vapor. The carbon dioxide is removed by bubbling the gas through a regenerative absorber, usually an aqueous solution of monoethanolamine. This solution is regenerated by heating it to a temperature sufficiently high to drive off the CO<sub>2</sub> and subsequently cooling it for return to the absorbing tower.

### Protects Against Decarb

The water vapor is removed by passing the gas through a dryer containing a dessicant such as activated alumina or silica gel. Partial drying can sometimes more economically obtain by the use of a refrigerated heat interchanger.

The purified exothermic gas thus produced is reducing and adequately protects medium and high carbon steel from decarburization. By the controlled addition of methane it can provide carbon restoration.

Endothermic gas is produced by the partial combustion of a hydrocarbon gas at a very low air-

*Turn to page F-44*





**ONE OPERATOR BRAZES MANY PARTS**—Copper brazing paste is applied as operator places assemblies on mesh-belt.

**SMOOTH FILLETS**—Brazed assemblies drop into tote box from G-E furnace clean and bright with smooth fillets at joints.

## by Brazing in General Electric Furnace

### Boosts Production and Lowers Costs By Eliminating Expensive Operations

Assembly rejects of metal ferrules cut 90%, material costs reduced, by brazing with a General Electric mesh-belt furnace, reports a large Chicago manufacturer of lubrication-system and automotive parts.

Says Henry Orth, General Foreman and Metallurgist of the Stewart Warner Corporation: "By brazing assemblies in a G-E furnace instead of welding them or machining the complete part from a single piece of stock, production per man hour has been boosted considerably. We've also been able to simplify the design of many parts. The over-all result: substantial savings in labor, handling, and material."

#### G-E FURNACE ELIMINATES 3 OPERATIONS

**Machining**—With furnace brazing, parts that formerly

had to be machined in one piece can now be broken down into simple components for quick production at low cost on screw machines or punch presses.

**Forging and Welding**—Parts formerly welded, or forged and welded, are now electric-furnace brazed with less labor. One unskilled operator can braze several times the quantity that could be welded by one man. After brazing, the parts are clean and bright with smooth joints. No machining is required.

#### G-E APPLICATION ASSISTANCE

Stewart Warner's experience is another example of the benefits of modern metal processing with electric furnaces. To improve your operation, look to General Electric, a pioneer in the development of better industrial heating equipment. G-E service facilities are unmatched by any other heating equipment manufacturer. For application help from a G-E Heating Specialist, contact your G-E Apparatus Sales Office.

**GENERAL  ELECTRIC**

**WRITE NOW FOR THESE MODERN METAL PROCESSING BULLETINS**

• Furnace and Induction Brazing, GEA-5889

• Annealing Malleable Iron, GEA-5797

• Forging with Induction Heat, GEA-5983

• Heat-treating Aluminum, GEA-5912

Address: General Electric Co., Section 723-128, Schenectady 5, N. Y.

# ROLOCK

## FABRICATED ALLOYS



*Loose joints  
that beat  
stiff competition*

When you are heat-treating metal parts at the extremely high temperature of 2350° F . . . followed by a brine quench . . . basket construction is vitally important.

In this instance, a large auto manufacturer asked Rolock engineers for a quantity of basket assemblies that would withstand the heat and shock of Mar tempering auto parts . . . with the greatest resistance to warping.

The answer was 18"-dia., 7½" deep Inconel baskets of 26 lbs. each. They were fabricated from ½"-dia. rod threaded thru flat bar and held in place by washers welded to the ends of the bar to form a loose jointed carrier . . . to take expansion and contraction without damage. A 4-mesh .080 wire disc is placed loosely in the bottom of the baskets.

There are many similar operations where loose joints will greatly extend basket life, reducing hourly costs . . . reflected in competitive quotations. Put us on the spot for solving heat-treating problems. We like it!

**SEND FOR CATALOG B-8 (HEAT TREATING)  
ON B-9 (CORROSION RESISTANT)**

SALES AND SERVICE REPRESENTATIVES FROM COAST TO COAST  
**ROLOCK INC. • 1362 KINGS HIGHWAY, FAIRFIELD, CONN.**

**JOB-ENGINEERED for better work  
Easier Operation, Lower Cost**

1RL54B

### —Furnace Atmospheres—

gas ratio. Insufficient heat is generated to support combustion. In actual operation combustion takes place in a retort which is heated by an independent source to a temperature high enough to support the combustion of the low air-gas ratio within the retort. Hence the name: endothermic.

At a low ratio of about 2.4 volumes of air to 1 of natural gas, the output gas contains about 20 pct carbon monoxide, 38 pct hydrogen, 0.5 pct methane and 41.5 pct nitrogen. CO<sub>2</sub> and O<sub>2</sub> are zero. Dew point is -10°F.

#### How to Control Carbon

This gas is strongly reducing. Air-gas ratios can be adjusted to give adequate protection to medium and high carbon steels from decarburization or for controlled carbon restoration.

Further refinements to purified exothermic gas can be accomplished for special applications. For instance, it has been found that a gas containing carbon monoxide cause etching of the edges of strip steel in coils during the long annealing cycle. A nitrogen-hydrogen gas overcomes this difficulty.

To remove the carbon monoxide from purified exothermic gas, it is mixed with steam, heated to a high temperature and passed through a catalyst. This converts the CO to CO<sub>2</sub>. The CO<sub>2</sub> is subsequently removed by the process previously described and the gas dried to the proper dew point.

#### High Purity for Stainless

Furnace atmosphere requirements for the bright annealing and brazing of stainless steel are for a gas of exceedingly high purity. Dew points of approximately -60°F are required. Purified hydrogen or dissociated ammonia are usually used. Furnace design must be such as to maintain this high gas purity.

Furnace atmospheres have largely replaced the pack method in carburizing. Purified exothermic gas or an endothermic gas acts as a carrier for a hydrocarbon gas in accurately con-

Turn Page

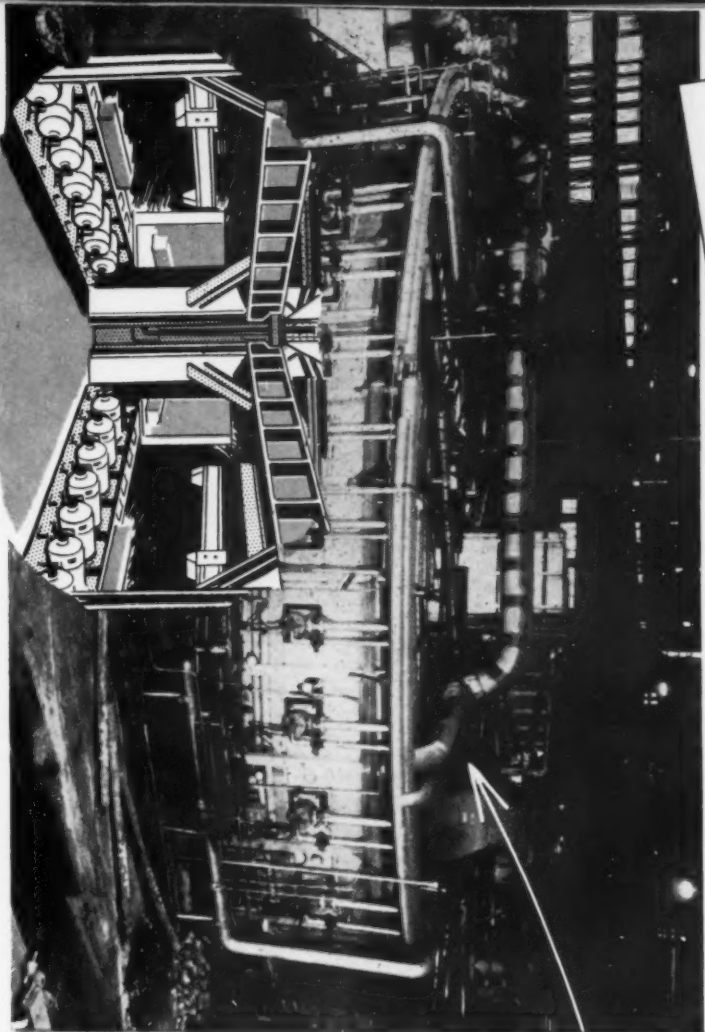
Check back for Advanced Engineering in Industrial Furnace Applications

2402 East Carson Street  
Pittsburgh 3, Pennsylvania

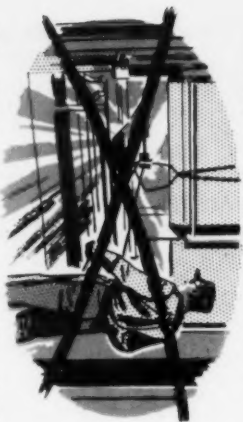
# HAGAN

## ROTARY HEARTH FURNACE

Automatically handles 300 billets an hour  
in **CONTINUOUS** Forging System!



Sketch above shows automatic loading and unloading of Hagan Rotary Hearth Furnace

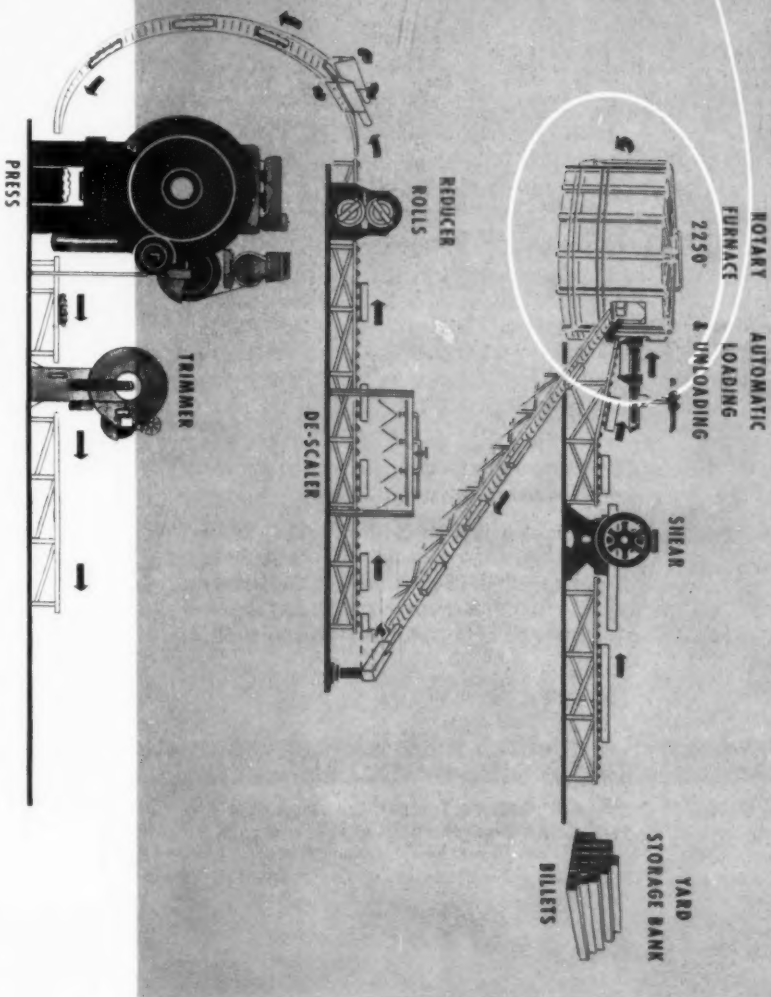


Outmoded manual method of loading and unloading furnace

### Charging, Heating and Discharging Cycle

#### *Completed* Automatically

The Hagan Automatic Rotary Hearth Furnace makes possible a continuous forging system—from storage yard to press. Charging mechanism automatically picks up billets and moves them into the furnace. Billets are lowered onto the hearth—no sliding action to cause wear to furnace floor. After loading, billet into furnace, the



hearth automatically turns to provide room for the next billet. Unloading, adjacent to loading is similar in operation, except in reverse. Automatic cycles as high as 300 per hour. Inlet conveyor, charger, moving of the furnace hearth, unloading and outlet conveyor are synchronized for continuous auto-

matic operation. Furnace can be gas or oil fired, with temperatures automatically maintained between 2250°F. and 2300°F. Billets are preheated by waste gases with resultant reduction in fuel consumption. Complete details gladly given upon request.

**GEORGE J. HAGAN COMPANY**  
2402 East Carson Street  
Pittsburgh 3, Pennsylvania

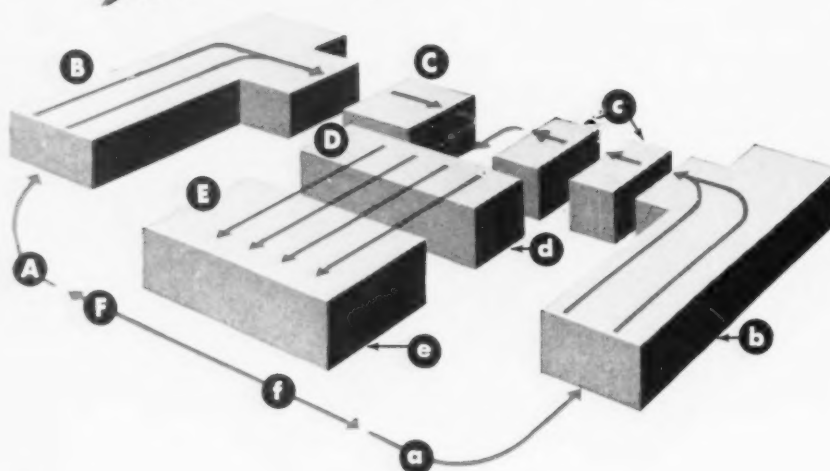


✓ *Check first* Hagan! For Advanced Engineering in Industrial Furnace Applications



# Heat Treat Furnace Layout

by *Holcroft* ...6th of a Series



- |  |  |
|--|--|
| A. Load  | a. Load  |
| B. 2-row continuous atmosphere carburizing furnace | b. 2-row continuous atmosphere carburizing furnace |
| C. Oil quench                                      | c. Salt bath quench and air blast cooling station  |
| D. 4-row washing machine                           | d. 4-row washing machine                           |
| E. 4-row draw furnace                              | e. 4-row draw furnace                              |
| F. Unload  | f. Unload  |

## How to Beat Heat Treat Costs!

Here's a furnace layout which is tricky—yet functional; one which steps up production—yet is flexible enough for different cycles!

Holcroft designed it to handle a variety of transmission parts requiring different processing cycles. In one case, parts are carburized, oil quenched, washed, and drawn. In the other, the stock is carburized, quenched in a salt bath, cooled with an air blast, washed, and drawn. The wash machine and draw furnace, though common to both cycles, are electrically independent.

While production flows at a rapid pace, the battery is so automatic that only a two-man crew is required for loading and unloading—one man on each side!

This is the type of furnace engineering that pays off in lower heat treat costs *to you!* And it's available on simple single-furnace jobs, or complex multi-furnace installations. It will pay you to write for more information—today! Holcroft & Company, 6545 Epworth, Detroit 10, Michigan.

BUILT BY  
**HOLCROFT & COMPANY**  
DETROIT, MICH.  
**PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE**

CHICAGO, ILL. • CLEVELAND, OHIO • HOUSTON, TEXAS • PHILADELPHIA, PA.

CANADA  
Walker Metal Products, Ltd.  
Windsor, Ontario

EUROPE  
S. O. F. I. M.  
Paris 8, France

## —Furnace Atmospheres—

trolled proportions that provide the proper case depth and surface carbon. Additions of ammonia to this gas provide a medium for carbonitriding.

Hand in hand with the development of atmosphere furnaces and atmosphere generators has gone the development and refinement of control equipment. Air-gas ratios, temperatures, dew points are accurately and automatically maintained. These insure a uniform output of clean, bright parts with accurately controlled surface carbon. Subsequent cleaning and grinding operations are entirely eliminated or minimized.

### INDUSTRIAL FURNACE SALES

Fuel Fired and Electric Types

Year	Fuel-Fired Industrial Furnaces, Including Hot Rolling Steel, \$	Electric Resistance Furnaces, \$	Total, \$
1941	34,124,751	13,719,111	47,843,862
1942	39,709,507	39,052,122	78,761,629
1943	16,951,800	12,855,326	29,807,126
1944	20,770,634	10,233,549	31,004,183
1945	22,102,225	9,464,210	31,566,435
1946	20,383,884	8,429,840	28,813,724
1947	22,569,770	7,799,584	30,369,354
1948	15,655,654	5,836,410	21,492,064
1949	9,982,440	5,284,021	15,266,461
1950	37,132,673	13,880,665	51,013,338
1951	82,140,769	43,497,718	125,638,487
1952	44,725,488	24,783,179	69,508,667
1953	42,917,377	18,710,314	61,627,691

These figures constitute approximately 60% of the industry. \* Includes "miscellaneous." Source: Industrial Furnace Mfrs. Assn.

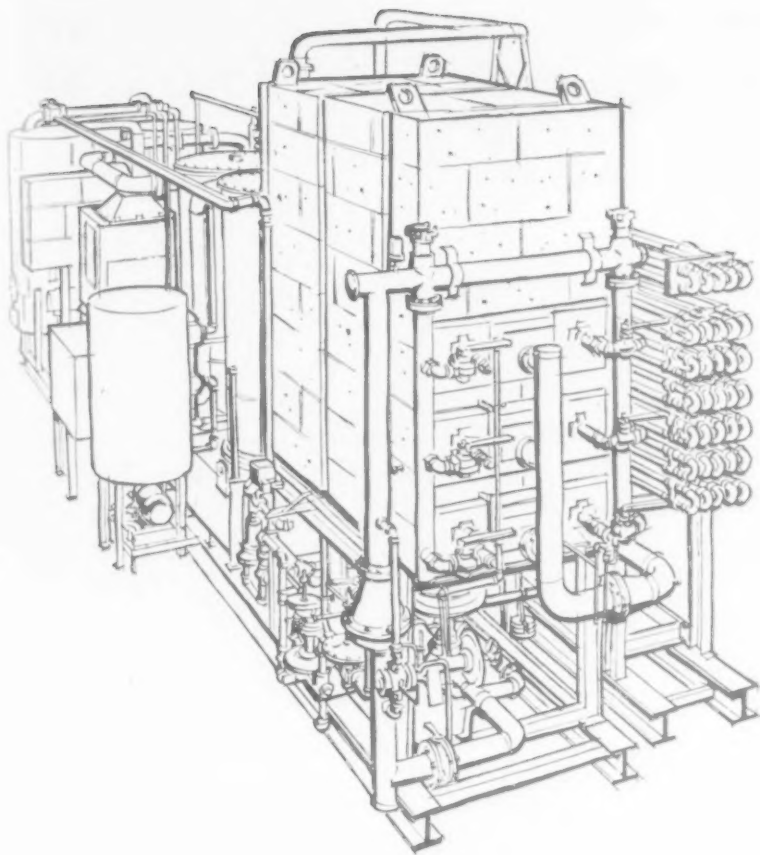
### METAL TREATING BILLINGS

Reported By Members Of The Metal Treating Institute

Year	Number of Members Reporting	Total Reported
1948	49	\$10,830,000.00
1949	47	8,790,000.00
1950	41	12,740,000.00
1951	49	24,930,000.00
1952—January	52	2,756,077.00
February	52	2,726,381.00
March	52	2,781,790.00
April	54	2,706,058.00
May	53	2,682,989.00
June	55	2,586,113.00
July	56	2,253,346.00
August	57	2,267,135.00
September	57	2,496,544.00
October	57	2,837,574.00
November	53	2,321,932.00
December	52	2,431,975.00
1952 TOTAL		\$30,075,924.00
1953—January	57	2,897,265.00
February	55	2,630,485.00
March	52	2,924,713.00
April	55	2,904,738.00
May	56	2,819,628.00
June	51	2,591,154.00
July	58	2,522,651.00
August	60	2,425,186.00
September	57	2,522,127.00
October	59	2,782,219.00
November	59	2,493,487.00
December	57	2,219,406.00
1953 TOTAL		\$31,733,067.00

Data represent about 65 pct of commercial heat treating industry.

Turn to page F-50



## ON THE MILL FLOOR

New markets open and customers are retained by developments on the mill floor. Steel surface quality, a major factor in customer acceptance, can be economically controlled through prepared atmospheres.

Many steelmakers have eliminated discoloration, "decarb," scale and other surface defects by using Surface Combustion prepared atmospheres. They have improved quality control, cut finishing costs by carbon correction and bright annealing, continuous or batch . . . clean hardening . . . clean annealing for galvanizing or tin plating.

Their customers know that this steel means lower tool and die costs, fewer rejects—more steel, in effect, for their dollar.

'Surface' builds many types of atmosphere generators, including RX, DX, NX, HNX, and AX generators for the steel industry. Literature Group S53-3 will show you how to get the right atmosphere for satisfied customers and new markets.



**S U R F A C E   C O M B U S T I O N   C O R P O R A T I O N   •   T O L E D O   1 ,   O H I O**

One-way fired soaking pits • Billet reheating furnaces • Slab heating furnaces • Continuous type, controlled atmosphere strip annealing and normalizing furnaces • Controlled atmosphere annealing covers for wire and rod • Controlled atmosphere annealing covers for coil and sheets • Continuous furnaces for heat treatment of steel plate • Controlled atmosphere furnaces for carbon correction in high alloy rod and bar stock • Continuous type bright annealing and normalizing furnaces • Prepared gas atmosphere generating equipment • Pit type convection furnaces for rod annealing • Stress relief furnaces • Wire patenting furnaces

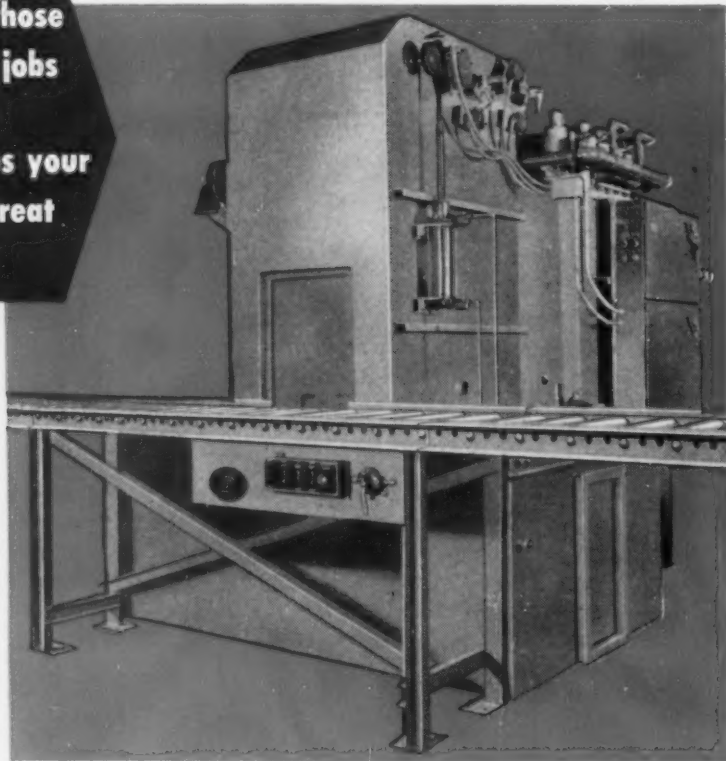
February 25, 1954

F-49

# DOW FURNACE <sup>model</sup> "J"

Licks those  
tough jobs

•  
Slashes your  
heat treat  
costs!



**"NO-GAP" OPERATION**—A batch type furnace with less than 30 seconds between loads. Work chamber is never exposed to air. Loading is accomplished while slow cooling or quenching a previous load.

**GREATER PRODUCTION**—The Dow Model "J" easily brings a 500 pound load from room temperature to 1500°F in less than an hour. Net capacity on light case work will range from 300 to 400 pounds per hour.

**COMPACT CONSTRUCTION**—Occupies floor area of only 7'10" x 14'4" giving maximum production for minimum floor space.

**VERSATILITY**—Ideal for carbonitriding, gas carburizing, clean hardening and carbon restoration. Hot oil quenching and atmosphere cooling equipment available.

**EXCLUSIVE FEATURES**—High capacity fan combined with heat capacitor assures uniform case depth throughout each load • Forced circulation of quench oil assures uniform hardness with minimum distortion • Sealed quench tank gives cleaner stock—minimizes fire hazard.

## DOW FURNACE COMPANY

12045 Woodbine Ave., Detroit 28, Mich.

Phone: KEnwood 2-9100

*First* WITH  
MECHANIZED, BATCH-  
TYPE, CONTROLLED  
ATMOSPHERE FURNACES

## Glossary of Heat Treating and Testing Terms

This glossary was compiled by Bethlehem Steel Co. from various sources, including that company's metallurgical department, and is reprinted with permission.

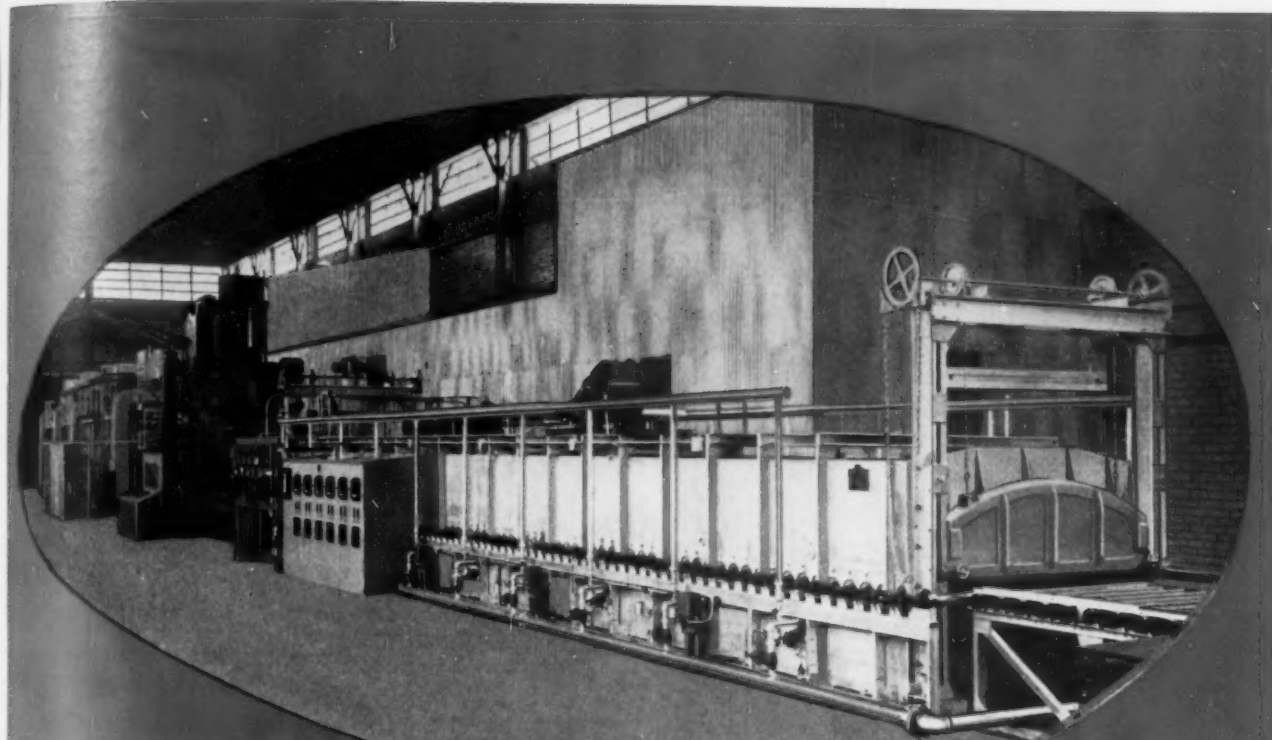
**Aging**—A change in a metal or alloy by which its structure recovers from an unstable or metastable condition produced by quenching (quench aging) or by cold working (strain aging). The degree of stable equilibrium obtained for any given grade of steel is a function of time and temperature. The change in structure consists in precipitation, often sub-microscopic, and is marked by a change in physical and mechanical properties. Aging which takes place slowly at room temperature may be accelerated by a slight increase in temperature.

**Annealing**—A comprehensive term used to describe the heating-and-cooling cycle of steel in the solid state. The term annealing usually implies relatively slow cooling. In annealing, the temperature of the operation, the rate of heating and cooling and the time the metal is held at heat depends upon the composition, shape and size of the steel product being treated and the purpose of the treatment.

The more important purposes for which steel is annealed are as follows: To remove stresses;

Turn Page





# DREVER

## Continuous PLATE HEAT TREATING LINES

Integrated high capacity heat treating lines, featuring the pressure quench, produce **FLAT** high quality plate . . . .

Continuous Oil or Gas-Fired Roller-Hearth Furnaces for hardening and tempering Commercial Heat Treated Plate and Armor Plate; also normalizing Low Carbon Plate and annealing Stainless Plate.

Complete line of Heat Treating Furnaces available. Whatever your specific problem, consult Drever.

# DREVER

CO.

770 E. VENANGO STREET  
PHILADELPHIA 34, PA.

## Heat Treating Terms

to induce softness; to alter ductility, toughness, electric, magnetic or other physical and mechanical properties; to change the crystalline structure; to remove gases; to produce a definite microstructure.

**Austempering**—A heat-treating process consisting in quenching an appropriate type of steel from a temperature above the transformation range in a medium having a suitably high rate

of heat abstraction, and maintaining the steel in the medium until transformation is complete at a substantially uniform temperature. This temperature is below that of pearlite formation and above that of martensite formation.

**Austenitic Steels**—Several classes of non-magnetic steels constituted of austenite at room temperature, such as: (a) stainless steels containing over 7 pct

nickel and over 24 pct for the sum of the nickel and chromium, with or without moderate additions of other elements; and (b) steels containing 11 to 14 pct manganese.

**Blue Brittleness**—Brittleness occurring in steel when in the temperature range of 400 to 700 F, or when cold after being worked within this temperature range.

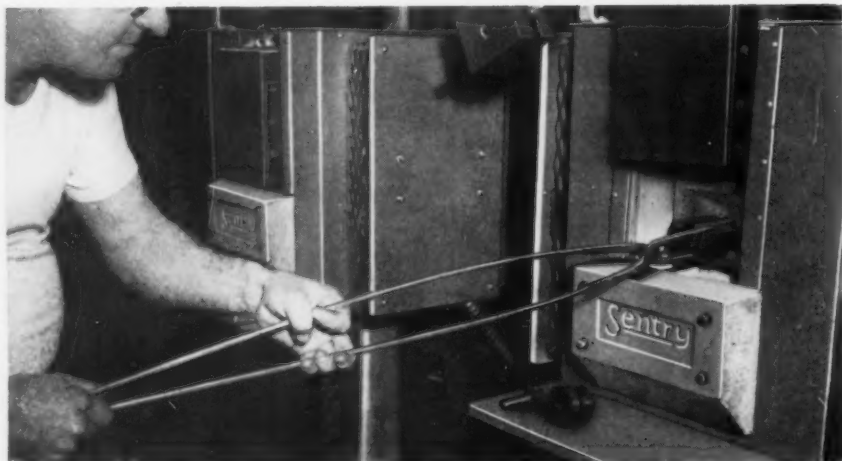
**Brinell Hardness**—A hardness number determined by applying a known load to the surface of the material to be tested through a hardened steel ball of known diameter. The diameter of the resulting permanent impression is measured. This method is not suitable for measuring the hardness of sheet and strip.

**Carburizing**—Adding carbon to the surface of steel by heating the metal below its melting point in contact with carbonaceous solids, liquids or gases. Carburizing is sometimes called cementation.

**Case Hardening**—A process of surface hardening involving a change in the composition of the outer layer of an iron-base alloy by inward diffusion from a gas or liquid followed by appropriate thermal treatment. Typical hardening processes are carburizing, cyaniding, carbonitriding, and nitriding.

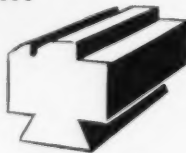
**Controlled Cooling**—A process by which a steel object is cooled from an elevated temperature in a predetermined manner to

Turn Page



## H.S.S. Heat Treating at New Britain Requires Accuracy

That's why they rely on Sentry Model Y electric Furnaces (see above) with the renowned Sentry Diamond Block atmosphere control. At the Screw Machine Products Division of the New Britain Machine Co., New Britain, Conn., they heat treat form tools, counter bores, reamers, gauges and fixtures, all of which must be completely free of decarburization and oxidation. Only Sentry is "Always on Duty" to guarantee this high performance.



This dovetail form tool must be perfect. The heat treating must be perfect also.

Request Catalog N-55

For optimum hardness with complete protection against scale or decarburization, heat treat H.S. steels with Sentry Model "Y" Furnaces and Sentry Diamond Blocks.

\* High Speed Steel

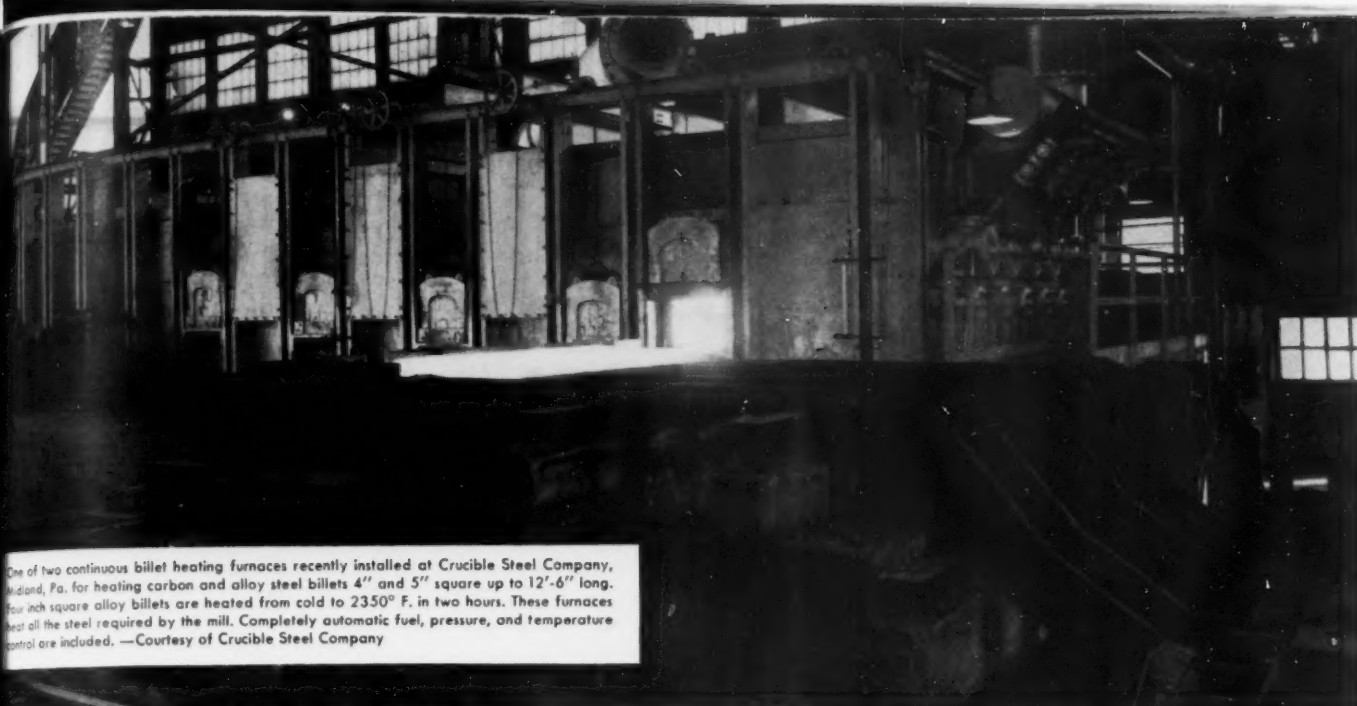


Illustrates and describes all sizes of Models Y and YP Furnaces and The Sentry Diamond Block Method.

**THE SENTRY COMPANY**  
FOXBORO, MASSACHUSETTS



"And then I said 'What safety rule?'"



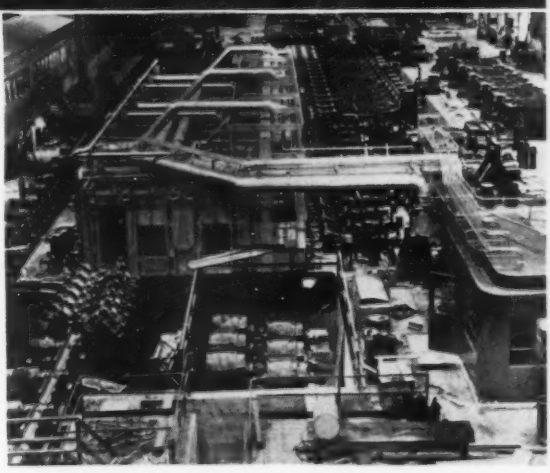
One of two continuous billet heating furnaces recently installed at Crucible Steel Company, Midland, Pa. for heating carbon and alloy steel billets 4" and 5" square up to 12'-6" long. Four inch square alloy billets are heated from cold to 2350° F. in two hours. These furnaces heat all the steel required by the mill. Completely automatic fuel, pressure, and temperature control are included. —Courtesy of Crucible Steel Company

# DEPENDABLE UP-TO-DATE DESIGN and OPERATION...

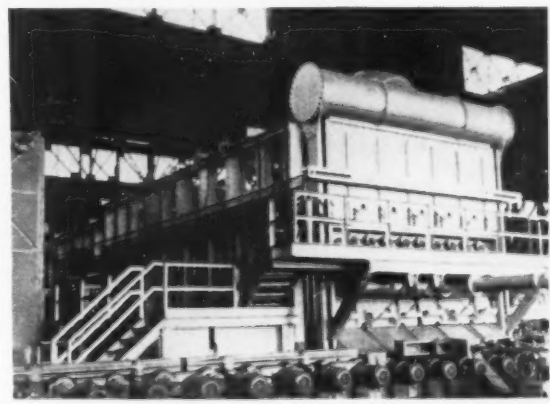
## with *Loftus* Continuous Heating Furnaces for Blooms • Slabs • Billets • Tube

Long years of experience by Loftus engineers in continuous heating furnace design and construction, coupled with practical innovations developed in recent installations produce dependable, trouble-free furnaces fitted to present day, cost cutting requirements. Loftus continuous heating furnaces are famous for operating efficiency, ease of maintenance, and outstanding availability. Throughout the world, Loftus engineers have designed and built one, two, and three zone installations utilizing all types of fuel. You can rely on Loftus to give you the best quality heating at lowest cost possible in your area.

A consultation with Loftus engineers can pay big dividends . . . Call or write—Today!



Continuous 75 ton per hour tube reheating furnace installed in one of the largest tube mills in this country. Heats up to 271 pieces per hour of 3½ to 4¾ inch O. D. pipe up to 65 feet long, to 1850° F. Three zone combustion control heats the tubes uniformly for further processing. Eighteen long flame burners located on each side wall burn coke oven or natural gas.



Continuous 50 metric ton per hour slab heating furnace recently installed in a Japanese steel plant for heating steel slabs 4½" x 24" x 13'-6". Slabs are heated from cold to 2360° F. in 1½ hours. Furnace is equipped with two zone, top and bottom oil-fired burners with screening burners on the discharge end. Two built-in tile recuperator cells of 5000 sq. ft. total heating surface, preheat the combustion air to approximately 725° F. This furnace was designed to achieve highest possible heat recovery, due to excessively high fuel cost in Japan.

Oil and gas-fired melting, heating and heat-treating furnaces of every type and description for ferrous and non-ferrous materials producing and processing.



**ENGINEERING CORPORATION**  
Designers and Builders of Industrial Furnaces  
610 Smithfield Street, Pittsburgh 22, Pennsylvania



## Heat Treating Terms

avoid hardening, cracking, or internal damage, or to produce a desired microstructure.

**Creep**—The slow deformation of steel under stress at elevated temperatures.

**Critical Range**—The structural changes which occur in steel take place at different temperatures (critical points) dependent upon whether the steel is

being heated or cooled. The range between critical points on heating and on cooling is known as the critical range.

**Decarburization**—When steel is subjected to high temperatures, such as are used in hot rolling, forging and heat-treating, there is a loss of carbon at the surface which is known as decarburization. The loss of carbon is influenced by such factors as

furnace design and operation, fuel, atmosphere, working temperature, time at heat, size and reduction in section. The degree of decarburization decreases from surface to interior. At the surface there may be complete loss of carbon, leaving a zone of ferrite. The next zone will have only a partial loss with the carbon gradually increasing inwardly to the normal carbon content of the steel.

**Deoxidizing**—This term is used in two ways: To indicate (1) the removal of oxygen from molten metal and (2) to reduce scale (an oxide of iron) on metal.

**Ductility**—The property of a metal which allows it to be permanently deformed, in tension, before final rupture. Ductility is commonly evaluated by tensile testing in which the amount of elongation and the reduction of area of the broken specimen, as compared to the original test specimen, are measured and calculated.

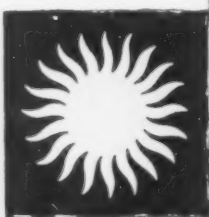
**Elastic Limit**—The greatest unit stress to which a material may be subjected without a permanent deformation remaining upon complete release of the stress.

**Elongation**—The amount of permanent extension in the ruptured tensile-test specimen; it

*Turn Page*



"How much an hour are you paying him?"

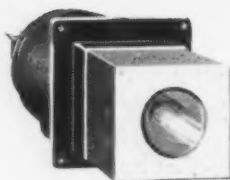


## High Heat Release FROM THERMAL BURNERS

- Heat release rates of 10,000,000 btu/hr per cubic foot of combustion space.

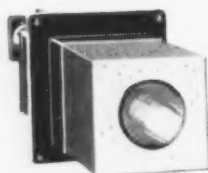
- Installation to existing heat equipment with conventional accessories and controls.

- Wide fuel-air ratio range for atmosphere generation.



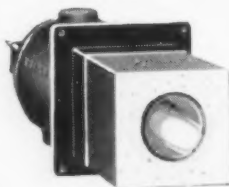
**OIL**

Clear flame combustion . . .  
90% completed in the burner block.



**GAS**

High velocity combustion . . .  
with maximum flame stability.



**COMBINATION**

The flame is the same . . .  
short and clear with either fuel.



# THERMAL

COMBUSTION & HEAT TRANSFER  
EQUIPMENT & ENGINEERING

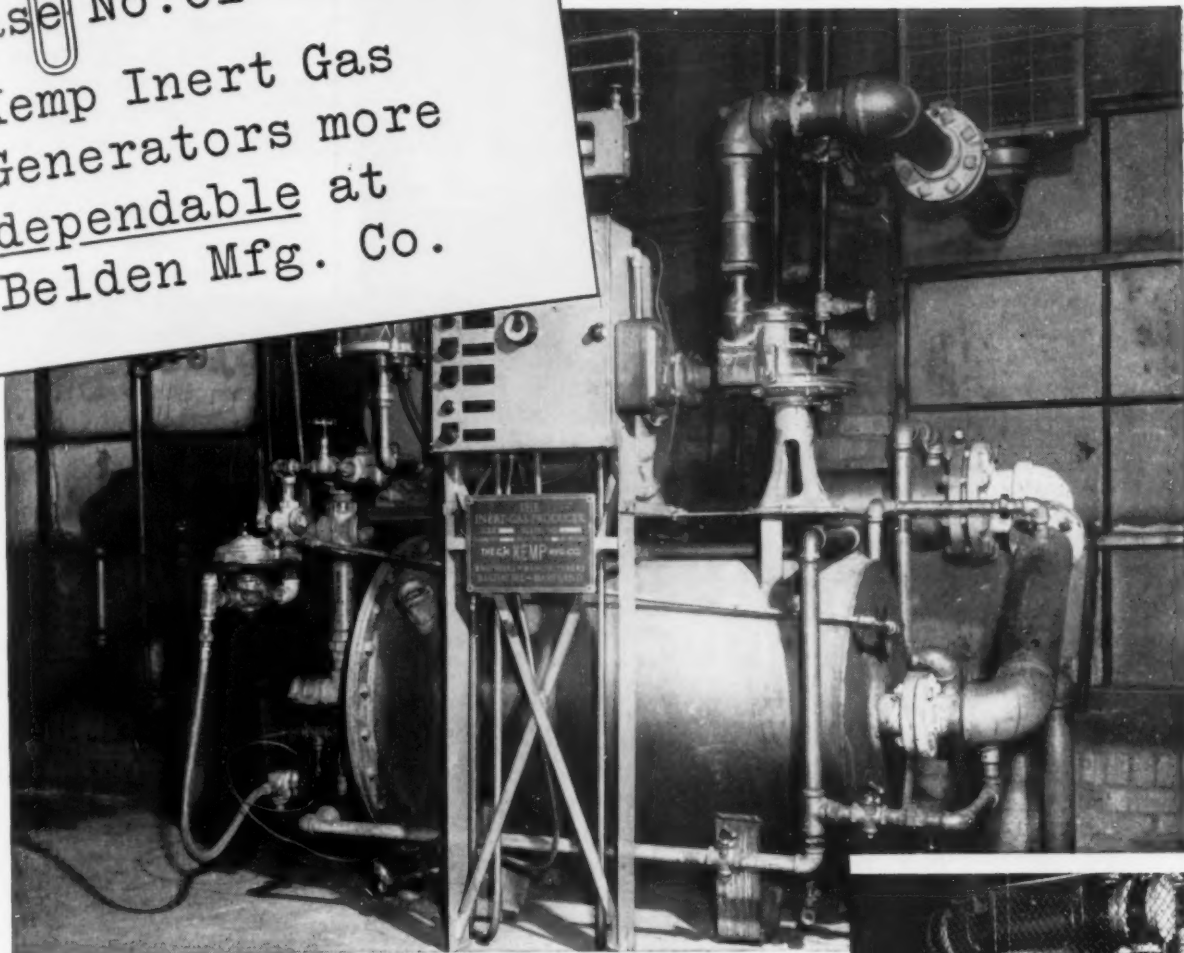
*Research & Engineering Corporation*

CONSHOHOCKEN, PENNSYLVANIA

REPRESENTATIVES IN PRINCIPAL CITIES

Case No. 61

Kemp Inert Gas  
Generators more  
dependable at  
Belden Mfg. Co.



## How Belden utilizes two Kemp Generators in annealing copper wire

Annealing copper wire necessitates cooling in an oxygen-free atmosphere to prevent harmful oxidation. For the required protective atmosphere in this process, the Belden Mfg. Co., Chicago, Ill., generates its own inert gas. But the generating equipment formerly used by Belden did not operate reliably . . . results were erratic. So Belden installed two Model MIHE Kemp Inert Gas Generators to handle this important job.

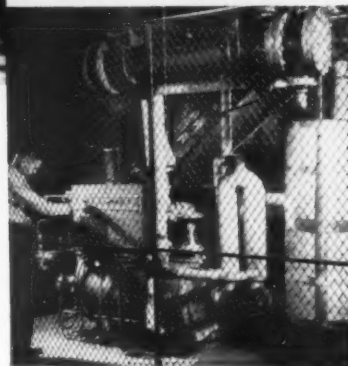
### And Kemp Handles the Job

These two Kemp units assure Belden of a dependable inert supply. They deliver a more constant flow at the rated pressure . . . have been operating smoothly and

satisfactorily since installation. Kemp's ability to produce a chemically clean inert at a *specific analysis regardless of demand* eliminates the danger of fluctuation at a critical stage.

### Kemp Units Engineered for Service

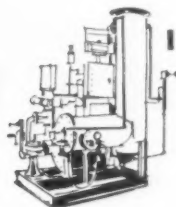
Like Belden, you specify reliability when you specify Kemp. Every Kemp design includes the Kemp Industrial Carburetor for complete combustion without tinkering, without waste . . . for simplified installation and maintenance. Every Kemp design includes the very latest fire checks and safety devices. Annealing, hardening, sintering—whatever your problem, find out today how Kemp engineers can help you.



Generator on first floor of plant is enclosed in wire cage to prevent tampering with controls.

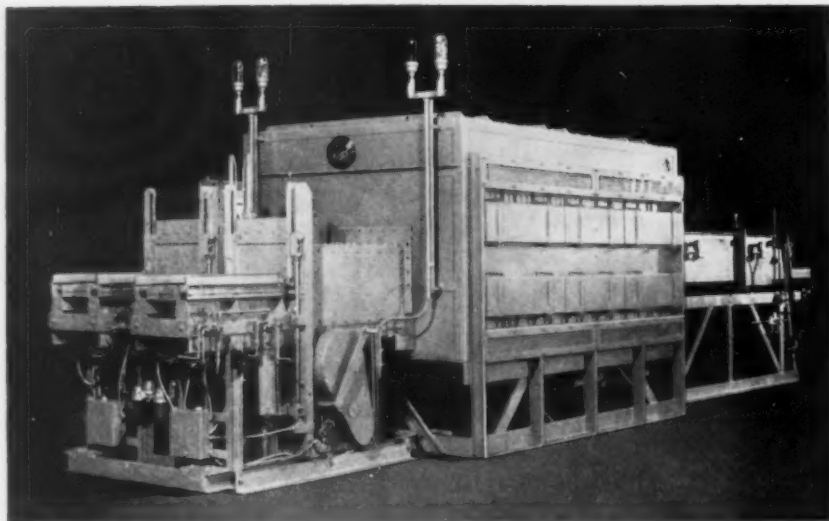
For more complete facts and technical information, write for Bulletin I-10 to: THE C. M. KEMP MFG. CO., 405 East Oliver Street, Baltimore 2, Md.

# KEMP OF BALTIMORE



## INERT GAS GENERATORS

CARBURETORS • BURNERS • FIRE CHECKS  
METAL MELTING UNITS • ADSORPTIVE DRYERS  
SINGING EQUIPMENT

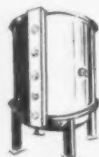


*A typical installation of a Harper Electric Double-Muffle Pusher Furnace installed at Thompson Products, Inc., Cleveland, Ohio used in expanding their activity in applying their knowledge of high strength powder metal techniques to the production of commercial structural parts.*

## DOUBLES PRODUCTION



BOX



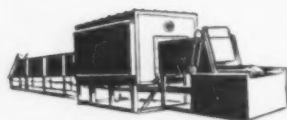
BELL



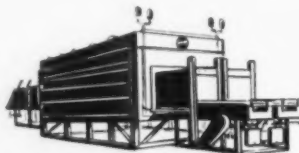
ELEVATOR



STRAND ANNEALING



CONTINUOUS MESH BELT CONVEYOR



TWIN AND SINGLE MUFFLE PUSHER

THOMPSON PRODUCTS, Metpro Division, Cleveland, Ohio...selected the Harper Electric Double Muffle Pusher Furnace because...it provides double the production, yet requires only about one half of the floor space necessary for two single muffle pusher furnaces to match its capacity.

Pusher mechanisms are simple mechanical design.

Straight line flow of product through the furnace gives trouble-free loading and unloading.

Harper double-muffle furnaces are available in several sizes, for brazing, sintering and heat treating.

Let us know your production and space requirements.

*Furnace Builders*



*for over 30 Years*

# HARPER

*Electric Furnace Corp.*

44 RIVER ST., BUFFALO 2, N. Y.

## —Heat Treating Terms—

is usually expressed as a percentage of the original gage length. It may also refer to the amount of extension at any stage in any process which continuously elongates a body, as in rolling.

**Endurance Limit**—A limiting stress, below which metal will withstand without fracture an indefinitely large number of applications of stress. If the term is used without qualifications, the cycles of stress are usually such as to produce complete reversal of flexural stress. Above this limit of applied stress failure occurs by the generation and growth of cracks until fracture results in the remaining section.

**Extensometer Test**—The extensometer test is a measurement of strain to determine the elastic property of metal.

**Ferrite**—One of the two crystalline forms assumed by iron. Ferrite is magnetic, soft, and acts as a solvent for the ferrite-strengthening elements, manganese, nickel, silicon, with which it forms solid solutions. Even when it contains substantial quantities of alloying elements, it is designated by the metallographic name, ferrite.

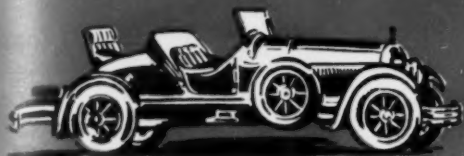
**Flakes**—Flakes are internal fissures in steel forgings or rolled products. In a fractured or etched surface or test piece they appear as sizable areas of

*Turn Page*

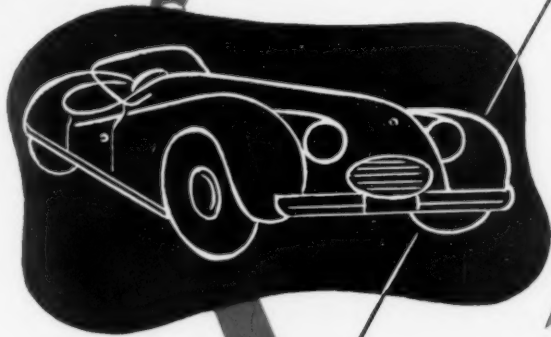


"I don't even know who he is but he's been yelling all morning around here about seniority rights!"



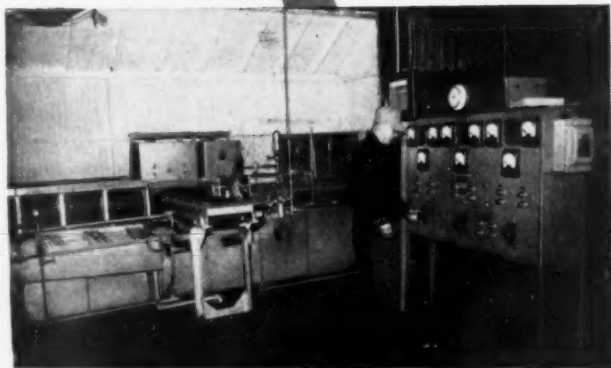


*Other* TIMES  
*Other* METHODS...

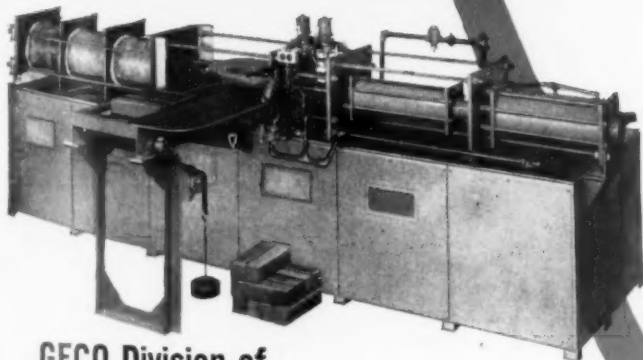


# Today it's **GECO** **INDUCTION**

**FOR THE NEWEST IN FORGING  
AND HEAT TREATING EQUIPMENT**



1200 KW Billet Heater and Control Panel.



1200 KW Steel Billet Heater — Dual Frequency. A Steel Billet is supplied every 22 sec. at 2200° F.

**GECO Division of  
MORRISON  
ENGINEERING  
CORPORATION**

30010 LAKELAND BLVD.  
ECLID STATION

**MORRISON  
ENGINEERED**

**DESIGNERS AND BUILDERS OF INDUSTRIAL FURNACES AND OVENS**

**CLEVELAND, OHIO** Associate Companies: **GENERAL ENGINEERING CO., LTD., TORONTO, CANADA**  
**BRITISH-GECO ENGINEERING CO., LTD., LONDON, ENGLAND • SOCIÉTÉ MANGIN, PARIS, FRANCE**

Today's production methods require modern, low-cost, efficient equipment. For instance — a Morrison-Geco user writes as follows:

"Prior to the installation of Morrison-Geco dual frequency induction heating equipment, we used a fuel-fired furnace to heat billets prior to forging. The cost of fuel was 18.14¢ per billet. Now we heat billets at a cost of 8.15¢ per billet, on an 8½ hour shift per day. In addition to saving about 10¢ per billet, there is a saving of 1.73 pounds of steel per billet, which amounts to 12.85¢ per billet. There is also a further saving in personnel, since our induction heating installation requires 5 less operators than the fuel-fired furnace.

"Three fuel-fired furnaces were formerly used to heat shells prior to nosing. Cost of the fuel was 5.95¢ per shell, and the operation required a staff of six men. Using Morrison-Geco induction heating equipment, the cost of electricity is 4.25¢ per shell, with only four men required."

Want additional facts, figures, and details? Write us today and learn how your plant operations can be improved with Morrison-Geco low-frequency induction heating equipment.

## Heat Treating Terms

silvery brightness and coarser grain size than their surroundings. Flakes can be minimized by thermal control. They are not to be confused with "woody fracture."

**Flame Hardening**—A process of hardening steel by heating the surface layer above the transformation temperature range by means of a high temperature

flame, followed by rapid cooling.

**Full Annealing**—A softening process in which metal is heated to a temperature above the transformation range and after being held for a proper time at this temperature is cooled slowly to a temperature below the transformation range. The objects are ordinarily allowed to cool slowly in the furnace,

although they may be removed from the furnace and cooled in some medium which assures a slow rate of cooling.

**Grain Size Number**—The ASTM designation of grain size is according to the formula:

$$(3/4) (2^{N-1}) = A \text{ min.}$$

$$(3/2) (2^{N-1}) = A \text{ max.}$$

where N = grain size number,  
A min. = minimum number of grains per square inch at 100 diameters magnification for a given value of N.

A Max. = maximum number of grains per square inch at 100 diameters magnification for a given value of N.

The number of grains corresponding to the grain-size number are shown on following page.

Grain size number	Number of grains per square inch at 100 diameters
1	Up to 1½
2	1½ to 3
3	3 to 6
4	6 to 12
5	12 to 24
6	24 to 48
7	48 to 96
8	96 and over

**Hardenability**—The ability of a steel to achieve a desired hardness, usually measured by the depth to which the steel will harden under defined conditions of heating and cooling. (See *Jominy Test*.)

**Hardenability Bands**—Curves showing the maximum and minimum hardness values expected when steel of a distinct composition is quenched under standard conditions, as shown on a diagram having "Rockwell Hardness C Scale" as the ordinate and "Distance from quenched end of specimen" in increments of 1/16 in. as the abscissa.

**Hardening**—The heating and quenching of certain iron-base alloys from a temperature above

Turn Page

## MAKE YOUR OWN

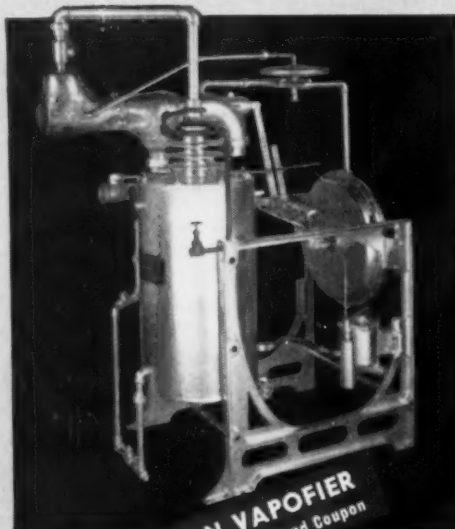
Industry's Dependable Gas Generator for All Ovens and Furnaces.

No More Loss or Delay from Gas Curtailment or Varying Pressures.

## 12 Vapofier Advantages

Sootless, Odorless Blue Flame, Constant Manifold Pressure, Constant Fuel-Air Ratio, Simple Automatic Operation, Instant Change To and From Gas, Greater Safety. Foolproof and Trouble-Free, Long Life; Low Maintenance, Faster Heat Penetration, No Gas-Storage Problem, Less Scale on Ferrous Work. For Bakers — Quicker Bakes, Softer Crusts, No Contaminating Odors.

Vaporizes Fuel Oil. Does Not Atomize It.



**MORE FACTS ON VAPOFIER and HOW IT WORKS. Send Coupon**  
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Send more facts on Vapofier

TO MANUFACTURERS OF GAS-FIRED EQUIPMENT . . . Added sales appeal with built-in Vapofier. Assures uninterrupted and low-cost gas.

## CARBURIZING

Faster . . . Less distortion . . .  
Closer depth control . . . Selective heating . . . Reheating operation eliminated . . . No "oxygenation" of the case . . . Carburizing can easily be combined with martempering or brazing.

## PROCESS ANNEALING

No scale, decarburization or other surface effects . . . Annealing cycles reduced from hours to minutes . . . Great savings in floor space . . . 50% lower first cost of equipment.

## HARDENING

Complete protection of work against pitting, scaling, carburizing or decarburizing . . . Heating cycles 4 to 6 times faster . . . Low operating and maintenance costs . . . First cost of equipment materially less.

## CYANIDING

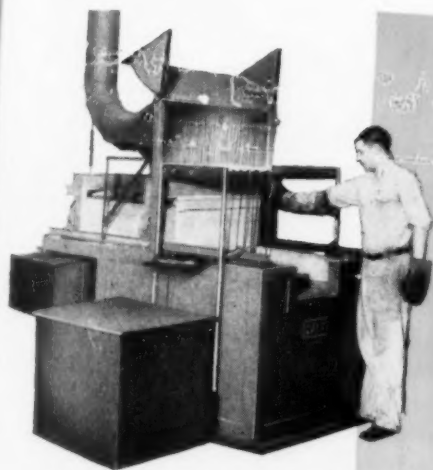
Large production in less space from smaller equipment . . . Minimum distortion . . . Higher and more uniform surface hardness of the finished product assures superior impact fatigue life.

## ALUMINUM HEAT TREATING

More production in less time . . . Faster, more uniform heating . . . Simplified quenching . . . Minimum warpage . . . Real protection to product by molten salt . . . Clean . . . No skilled labor needed.

## CLEANING—DESCALING

Handles more work with less labor . . . Less floor space . . . Less time . . . Different metals and shapes can be cleaned or descaled simultaneously . . . Uniform cleaning does not affect base metal.



# SAVE WITH SALT BATH HEAT TREATING!

Note these typical advantages

## MARTEMPERING and AUSTEMPERING

No oil quenches required . . . Negligible distortion cuts costs by permitting machine finishing before hardening . . . Scale, decarb and quench cracks eliminated . . . Toughness and ductility are increased.

## BRAZING

Work can be immersed in batches for maximum speed and economy . . . All joints brazed simultaneously in seconds . . . No decarburization of steel assemblies . . . No cooling chamber needed . . . Can be simply combined with carburizing or hardening.



GET THE FACTS!

Write today for your copy of this 72-page Ajax Salt Bath Catalog 116B — NEW EDITION.

## AJAX ELECTRIC COMPANY

904 Frankford Avenue, Philadelphia 23, Pa.  
Associate companies: Ajax Electric Furnace Corp., Ajax Engineering Corp., Ajax Electrothermic Corp.



# AJAX

HULTGREN

## ELECTRIC SALT BATH FURNACES

World's largest manufacturer of electric heat-treating furnaces exclusively

February 25, 1954



## Heat Treating Terms

the critical-temperature range for the purpose of producing a hardness superior to that obtained when the alloy is not quenched. This term is usually restricted to the formation of martensite.

Any process of increasing the hardness of metal by suitable treatment, usually involving heating and cooling.

**Heat Treatment**—An operation or

combination of operations involving the heating and cooling of a metal or an alloy in the solid state for the purpose of obtaining certain desirable conditions or properties. Heating and cooling for the sole purpose of mechanical working are excluded from the meaning of the definition.

**Impact Test**—A test in which one or more blows are suddenly ap-

plied to a specimen. The results are usually expressed in terms of energy absorbed or number of blows of a given intensity required to break the specimen.

**Isothermal Transformation**—A process of transforming austenite in any given steel to ferrite or a ferrite-carbide aggregate at any constant temperature within the transformation range.

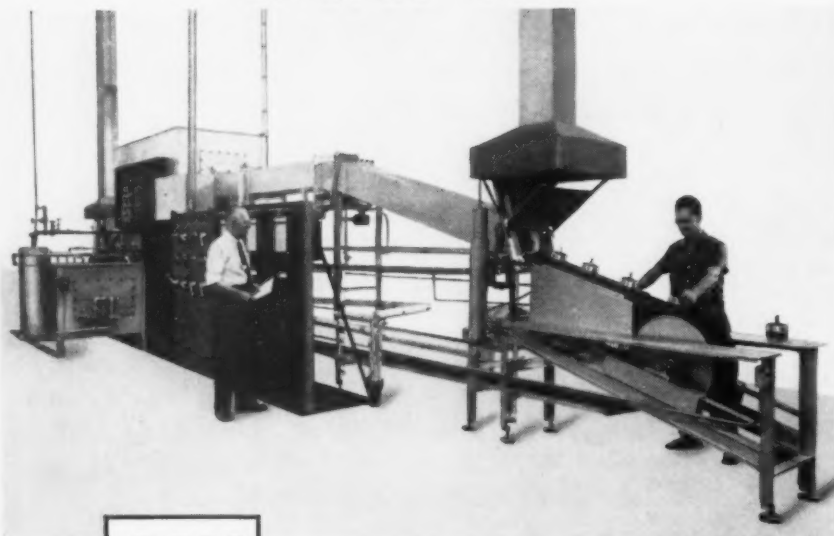
**Jominy Test**—The Jominy test is used for determining end-quench hardenability. It consists in water quenching, under closely-controlled conditions, one end of a 1-in. diameter specimen of the steel under test and measuring the degree of hardness at regular distances from the quenched end along the side.

**Martensite**—Martensite is a microconstituent or structure in quenched steel characterized by an acicular or needle-like pattern on the surface of polish. It has the maximum hardness of any of the structures resulting from the decomposition products of austenite.

**Modulus of Elasticity**—The modulus of elasticity is the ratio, within the limit of elasticity, of the stress to the corresponding strain. The stress in psi is

*Turn page*

## Less atmosphere, lower cost



S&W "A" type furnace used in conjunction with S&W Ammonia Dissociator. Low openings at both ends prevent infiltration of air, seals gases in furnace.

### "A" TYPE CONVEYOR FURNACE

In producing brazed or annealed work with a bright surface finish, you can sharply cut operating costs by reducing atmosphere volume required. With this S&W full muffle wire mesh conveyor belt furnace you get uniform high quality production, combined with lower operating cost than is possible with conventional straight-through type furnaces. Of special interest to stainless steel processors, it is particularly suited for such high production heat treating

operations as bright annealing, bright hardening, bright brazing and case hardening. Ask for our interesting data on how this cost-cutting S&W furnace is currently used to do better work at lower cost.

*Write today for details on S&W Full Muffle "A" Type Conveyor Furnaces. State your regular requirements — we'll advise without obligation.*

#### Doors Open 8" Above Belt!

One S&W "A" Type Furnace now used to bright copper braze stainless steels has 8" clearance above belt — contradicting usual belief that working height of constantly opened furnace doors must be less than 3" to get bright work. Ask about other ingenious installations.



**SARGEANT & WILBUR, INC.**  
188 Weeden Street, Pawtucket, R. I.

Complete Line of Electric and Fuel-Fired Furnaces To Meet Every Industrial Need  
Atmosphere Generators • Ammonia Dissociators • Gas Conditioning Equipment

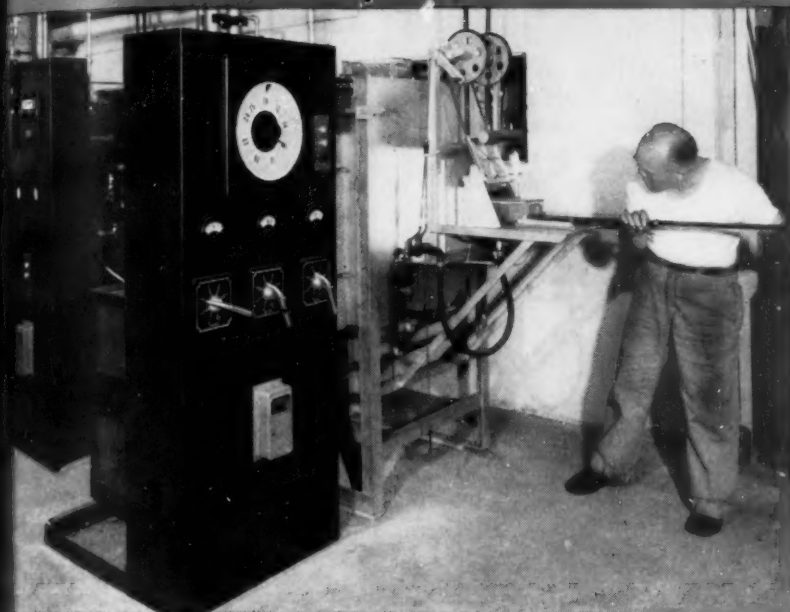


"That's the trouble with those grubby accountants—always taking a financial attitude towards costs!"

# NEW HAYES "AMPRO" PROCESS

(PATENT APPLIED FOR)

## Bright Heat Treatment of High Speed and other Tool Steels



In actual use more than one year at  
**Staats & Staats, INC.**

Pitcairn, Pennsylvania

This Hayes "Certain Curtain" Pusher Type Furnace, designed for bright heat treatment of High Speed and other tool steels, has been in continuous operation on bright heat treating and copper brazing of high carbon high chrome work at Staats & Staats for over a year.

*with these results:*

### CLYDE C. STAATS, PRESIDENT, SAYS —

- (1) Our Hayes Ampro Atmosphere Furnace is used to bright harden and copper braze intricate die parts.
- (2) Complete elimination of oxidation or discoloration on parts being heat-treated.
- (3) Reduces dimensional change of materials due to elimination of oxidation. A closer tolerance held.
- (4) Cuts valuable bench and polishing time on intricate dies with the savings as high as 20%.
- (5) Reduces cost of manufacturing form dies as much as 50% by form grinding dies in various segments and copper brazing with the atmosphere control.

## "AMPRO" available to you on the basis of PROVEN RESULTS IN ACTUAL OPERATION!

Unique Hayes "Ampro" Process of Dissociated Ammonia with Propane Injection gives completely clean truly BRIGHT heat treatment.

Minimum volume of protective atmosphere requirements cuts down cost of operation.

BA Type furnaces range in temperature up to 2400°F for both High Speed and High Carbon High Chrome steels.

Furnaces are readily adaptable for drawing operations when required.

CALL OUR NEAREST REPRESENTATIVE — REQUEST "AMPRO" DATA

**I. HAYES INC. 65 BAKER ST., PROVIDENCE, R. I.**

Manufacturers of Electric Furnaces Since 1905



W. H. WELLS  
HEATING  
P. O. BOX 221  
Duluth, Minn.

R. G. HESS  
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Chicago, Ill.

JOHN E. FIGNER CO.  
1123 LaClair Ave., Regent Sq.  
Pittsburgh 18, Pa.



## Heat Treating Terms

divided by the elongation in fractions of an inch for each inch of the original gage length of the specimen.

**Normalizing**—Heating iron-base alloys to approximately 100 F above the critical temperature range followed by cooling to below that range in still air at ordinary temperature.

**Pearlite**—Pearlite is the lamellar aggregate of ferrite and iron

carbide resulting from the direct transformation of austenite at the lower critical point.

**Physical Properties**—Physical properties are those familiarly discussed in physics, exclusive of those described under mechanical properties; for example, density, electrical conductivity, coefficient of thermal expansion. This term has often been used to describe mechan-

ical properties, but this usage is not recommended.

**Proof Stress**—Stress in psi required to produce a permanent tensile or compressive set of 0.01 in./in. or less in the specimen. No standard has been adopted for the amount of permanent set for given materials; therefore, published values may not be comparable.

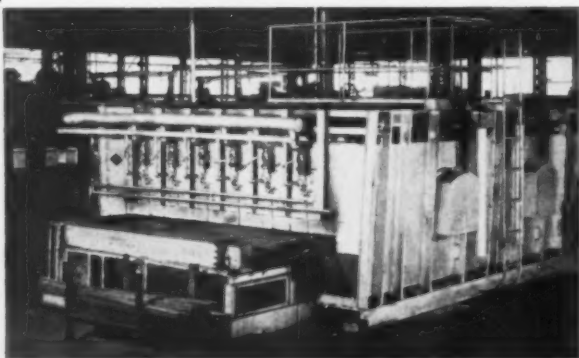
**Proportional Limit**—Proportional limit is the greatest unit stress which a material is capable of developing without a deviation from the law of proportionality of stress to strain.

**Quenching and Tempering**—In this operation the procedure consists in heating the material to the proper austenitizing temperature, holding at that temperature for a sufficient time to effect the desired change in crystalline structure, and quenching in a suitable medium—water, oil, or air, depending upon the chemical composition. After quenching, the material is reheated to a predetermined temperature below the critical range and then cooled under suitable conditions.

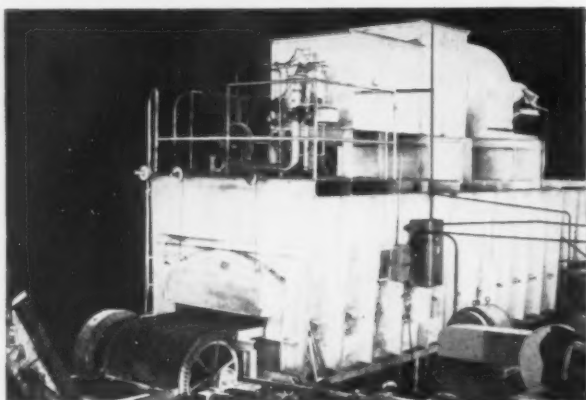
**Reduction of Area**—The percentage reduction of area is the difference between the original cross-sectional area and the least cross-sectional area after rupture, expressed as a percentage of the original cross-sectional area.

Turn to Page F-68

## A top production team



Continuous production, screw conveyor furnace for pre-heating rod for coil spring forming.



Continuous production, recirculating furnace for drawing coiled springs.

Like many other processes, making large, heavy coil springs requires special types of furnaces. The two furnaces shown above were Jet designed and built to do this unusual job in the most efficient and economical way. One important economy factor has been continuous operation with minimum maintenance costs over a long period of years. Jet specializes in engineering furnaces for difficult production problems.

It's a good bet to see **JET** ....

**JET** combustion, inc.

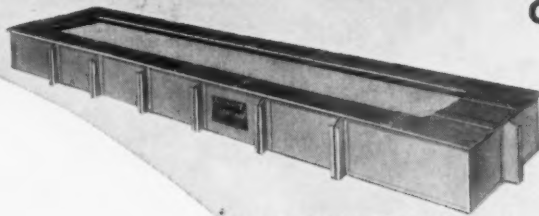
INDUSTRIAL FURNACES • EQUIPMENT ENGINEERS  
7917 South Exchange Avenue Chicago 17, Illinois



He works in small parts assembly.



**THERE IS A SUNBEAM STEWART INDUSTRIAL FURNACE FOR EVERY NEED  
GAS • ELECTRIC • OIL**



**GALVANIZING**

# Sunbeam STEWART

**THE BEST INDUSTRIAL FURNACES MADE**

- Longer furnace life • Greater production
- Lower operating cost

As a division of Sunbeam Corporation we have the opportunity of working with our furnaces in the production of Sunbeam appliances, lawn sprinklers, sheep shears, animal clippers, etc. In manufacturing our own products, we must contend with practically every heat treating problem faced by industry—a position unique in the furnace manufacturing field.

This experience with our own furnaces in large volume production enables us to render a service to you far beyond other manufacturers. That is one reason why Sunbeam Furnace installations have been so successful. They are based not only on furnace engineering ability, but on practical experience under actual operating conditions. We have learned through actual experience the factors that give longest furnace life ... greatest production ... best quality ... and lowest operating cost.

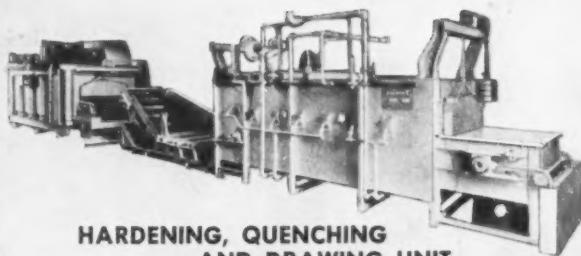
Our highly trained technical staff of furnace engineers who for over 50 years have built furnaces for the leading companies throughout the United States and abroad are qualified to recommend the correct type of furnace to meet your requirements.

## MODERN AUTOMATIC HEAT TREAT EQUIPMENT MAY BE THE ANSWER TO YOUR PROBLEM

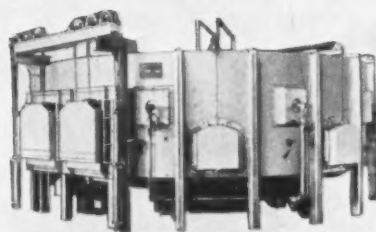
Sunbeam engineers can help you keep pace with modern production methods. Replacement of obsolete or inefficient heat treating equipment with an automatic Sunbeam installation reduces costs, improves quality, pays for itself in a short time.



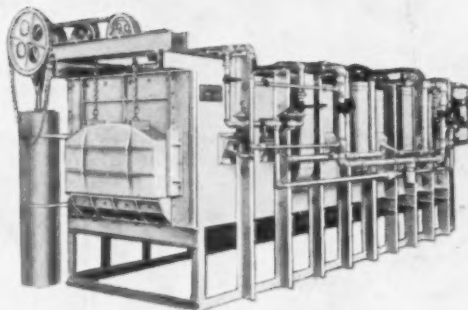
**RECIRCULATING  
FURNACES**



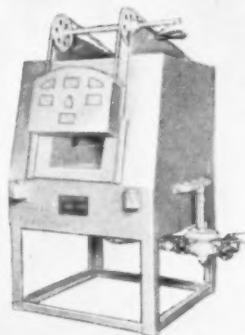
**HARDENING, QUENCHING  
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**ROTARY HEARTH FORGE**



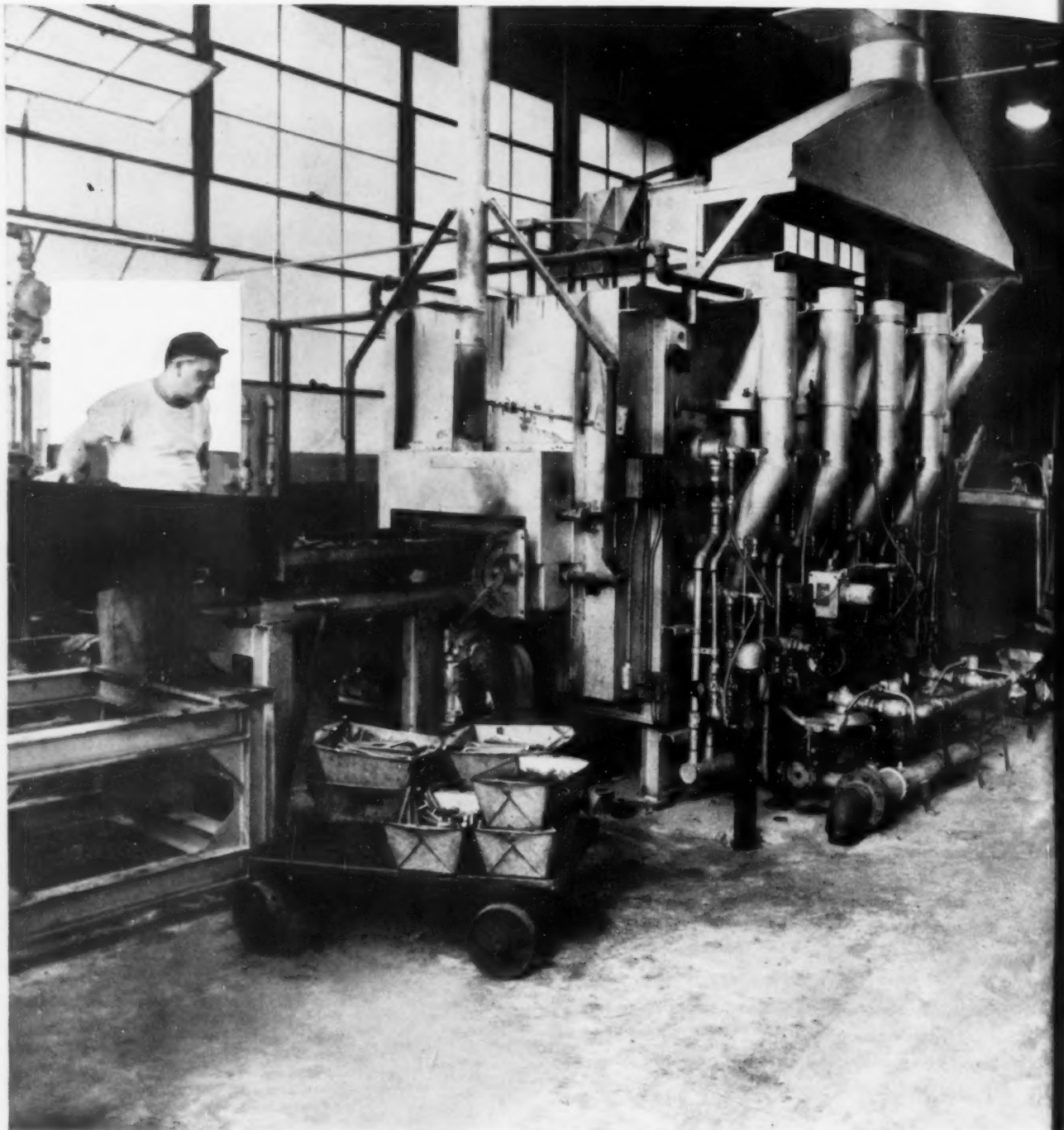
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**SEMI-MUFFLE AND FULL MUFFLE  
OVENS**

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Above is the general view of the charging end of the Westinghouse Shaker Hearth Furnace installation at The Allen Manufacturing Co.



IF YOUR PRODUCT CALLS FOR HEAT-TREATING ... IT CALLS FOR  
A WESTINGHOUSE FURNACE ... GAS OR ELECTRIC

# "One furnace...one operator... gives us continuous hardening and tempering" ... says The Allen Manufacturing Co.

"For the top quality of our Allen socket-type screws and wrenches, it is imperative that we get the ultimate in carbon restoration after continuous hardening and tempering, as well as in carbonitriding when specified. We obtain this close quality control with our Westinghouse Gas-Fired Shaker Hearth Furnace, Endogas® Generator and Continuous Belt Tempering Furnace.

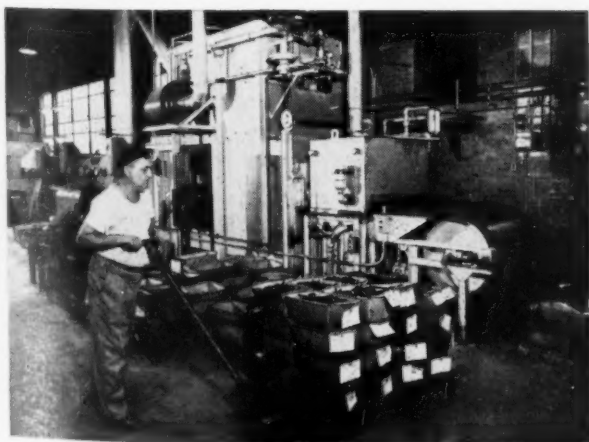
"In one continuous cycle we are now able to *harden, quench, wash, temper and quench again* our alloy steel products. Before, this had to be

done by several pieces of equipment. Now, all of this is a *one-furnace, one-man* operation.

"Our Westinghouse Furnace was shipped assembled and complete. All we had to do was install the connecting utilities."

With Westinghouse Heat-Treating Furnaces ... GAS-FIRED OR ELECTRIC... you get the heat-treating flexibility you need and want. Westinghouse Electric Corporation, Industrial Heating Department, Meadville, Pa. J-10415

YOU CAN BE SURE... IF IT'S  
**Westinghouse**



General view of the discharge end, showing detail of the recirculating draw furnace. Note the convenient location of the finished work.



View of the oil quench with the belt-type conveyor. Part of the over-all control panel is visible. Close to furnace for easy reading.



## Heat Treating Terms

**Mechanical Properties**—Mechanical properties reveal the reaction, elastic and inelastic, of a material to an applied force. These properties have often been designated as physical properties, but the term mechanical properties is much to be preferred. The properties, tests and units are listed in the tables at the right and on the facing page.

PROPERTY	TEST	UNITS
Cold bending	Cold-bend	degrees
Collapsing strength	Compressive	psi
Compressive strength	Compressive	psi
Corrosion-fatigue limit	Corrosion-fatigue	psi
Creep strength	Creep	psi; 1,000, 10,000 or 100,000 hr
Drawing	Cupping; Olsen; Erichsen; Guillery; Wasau	degrees
Elastic limit	Tensile; compressive	psi
Elongation	Tensile	pct
Endurance limit	Endurance	psi
Fatigue limit	(See Endurance Limit)	
Hardness	Dynamic; static; Amel-Vickers; Ballentine; Srinell; Firth; Herbert; Knoop; Loosenhausen; Monotron; Rockwell; Sclerograph, Scleroscope, Shore; Walze; Wust and Bardenhauer.	empirical number ranges
Impact, bending	Charpy, Izod	ft-lb
Impact, bending	Drop	ft-lb

**Rockwell Hardness Test**—In this test a machine measures hardness by determining the depth of penetration of a penetrator into the specimen under certain arbitrary fixed conditions of test. The penetrator may be either a steel ball or a diamond spherocone.

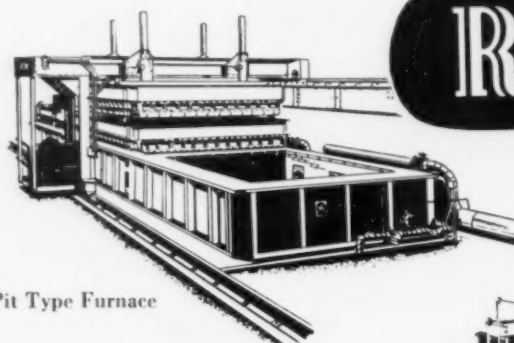
**Scleroscope**—A machine which gives a comparative hardness value of a material by measuring the rebound of a diamond-tipped hammer which falls freely from a set height.

**Sorbite**—A transition form between troosite and pearlite. Sorbite is generally considered as an uncoagulated mixture of troostite and pearlite or an imperfectly-developed pearlite.

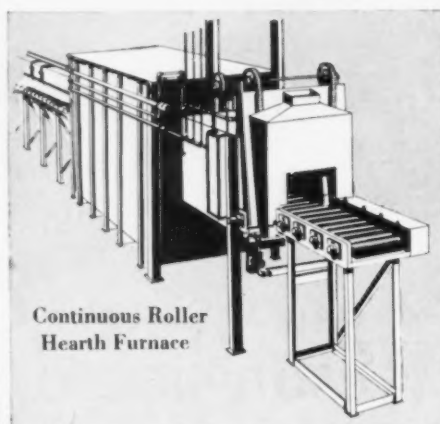
**Spheroidizing**—Prolonged heating of iron-base alloys at a temperature in the neighborhood of, but generally slightly below the critical temperature range, usually followed by relatively slow cooling.

**Stress Relieving**—A process of reducing internal residual stresses in a metal object by heating to a suitable temperature and holding for a proper time at that temperature. This treatment may be applied to relieve stresses induced by casting, quenching, normalizing, machining, cold working, or welding.

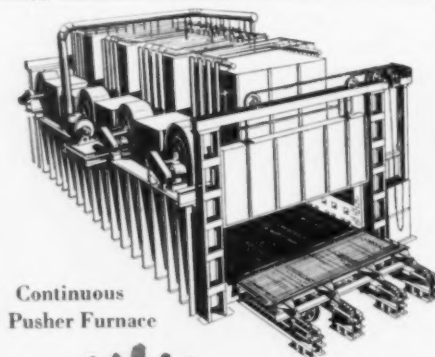
**Temper Brittleness**—This is a type of brittleness that is shown by the notched-bar test, but not always by the tensile test, in certain types of steel after tem-



Pit Type Furnace



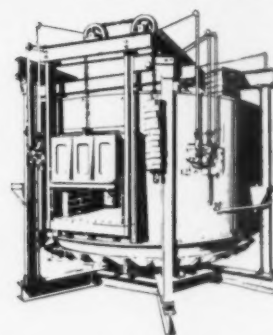
Continuous Roller Hearth Furnace



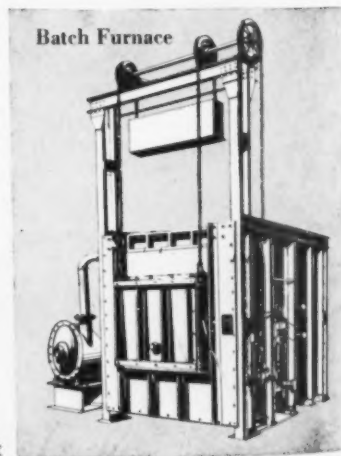
Continuous Pusher Furnace

# R-S HEAT

Rotary Hearth Furnace



Batch Furnace



## R-S FURNACE TYPES

Hi-Head • Batch • Rotary Hearth • Continuous  
Belt Conveyor • Continuous Chain • Continuous  
Pusher • Continuous Pusher Tray • Pit •  
Continuous Roller Hearth • Car Hearth

PROPERTY	TEST	UNITS
Impact, torsional	Torsional Impact	ft-lb
Modulus of rupture	Bond	psi
Penetration resistance	(See Hardness)	
Proof stress	Tensile; compressive	psi
Proportional limit	Tensile; compressive	psi
Reduction of Area	Tensile	pct
Shear strength, double	Shear	psi
Shear strength, single	Shear	psi
Tensile strength	Tensile	psi
Torsional strength	Torsional	psi
Transverse elongation	Tensile	pct
Transverse reduction of area	Tensile	pct
Transverse tensile strength	Tensile	psi
Transverse yield strength	Tensile	psi
Yield point	Tensile	psi
Yield strength	Tensile	psi

pering. Temper brittleness is influenced to a marked extent by the composition of the steel, the tempering temperature, and the subsequent rate of cooling.

**Temper Colors**—The colors which appear on the surface of steel heated at low temperature in an oxidizing atmosphere.

**Tempering**—Reheating hardened steel to some temperature below the lower critical temperature, followed by any desired rate of cooling. The object of tempering a steel that has been hardened by quenching is to release stresses set up, to restore some of its ductility and to develop toughness through the regulation or readjustment of the embrittled structural constituents of the metal. The time-temperature conditions for tempering may be selected for a given composition of steel to obtain almost any desired combination of properties.

**Tensile Strength**—The maximum load per unit of original cross-sectional area sustained by a material during the tension test.

**Tension Test**—A test in which a specimen is broken by applying an increasing load to the two ends. During the test the elastic properties and the ultimate tensile strength of the material are determined. After rupture the broken specimen may be measured for elongation and reduction of area.

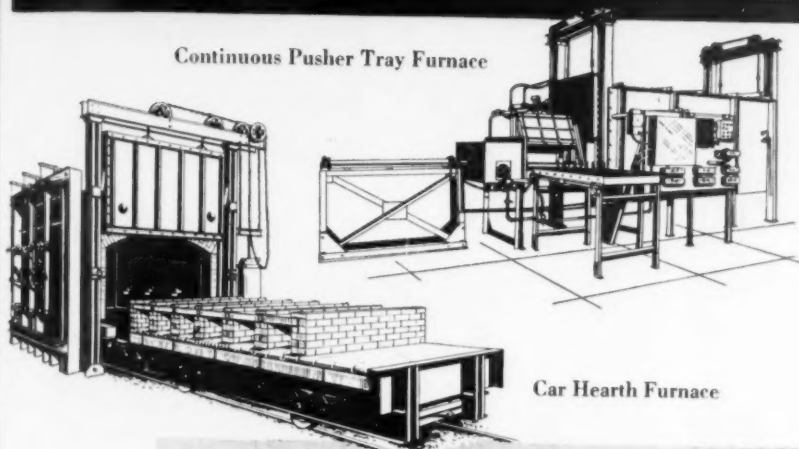
**Troostite**—Troostite is a micro-constituent of a hardened-and-tempered steel which etches rapidly, and therefore usually appears dark. It consists of a very fine aggregate of ferrite and cementite and is not resolved under the microscope.

**Yield Point**—The yield point is the load per unit area at which a marked increase in deformation of the specimen occurs without increase of load; in other words, the yield point is the stress at which a marked increase in strain occurs without an increase in stress.

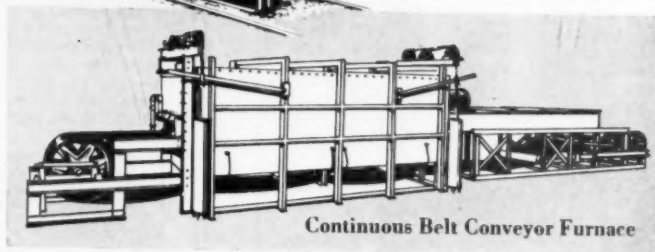
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## TREATING FURNACES

Continuous Pusher Tray Furnace

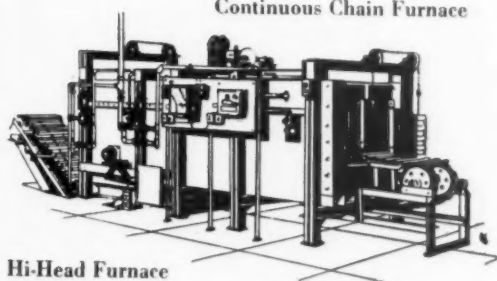


Car Hearth Furnace



Continuous Belt Conveyor Furnace

Continuous Chain Furnace



Hi-Head Furnace

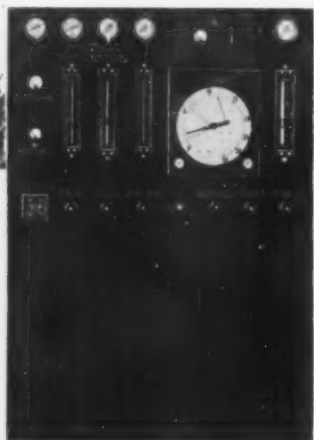
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4555 GERMANTOWN AVENUE  
PHILADELPHIA 44, PENNSYLVANIA

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**HARDINGE COMPANY, INC.**



## HEAT TREATING OF STAINLESS STEEL



## NITRONEAL GAS GENERATOR

... Produces pure nitrogen with a controllable hydrogen content that can be varied at will and maintained at any percentage from .25% to 25% to best suit work in furnace.

Used for bright annealing, heat treating, and furnace brazing of stainless steel, low and high carbon steels and non-ferrous metals.

- Fully Automatic
- No Operating Personnel Required
- No Explosion Hazard
- 30% Less Costly than Dissociated Ammonia.

Units available in 100 C.F.H. to 10,000 C.F.H. capacities.

Write for Booklet No. 21

**BAKER & CO., INC.**

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NEW YORK • SAN FRANCISCO • LOS ANGELES • CHICAGO

## Industrial Furnaces

### Temperature Ranges Industrial Heating Operations

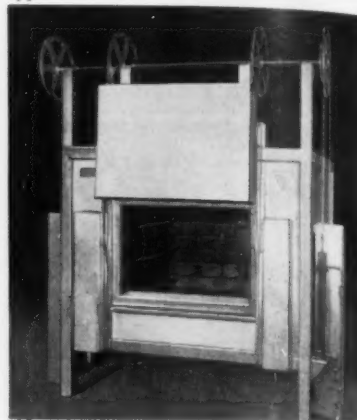
Table courtesy Hauck Mfg. Co.

MATERIAL	Operation	Approx. Temp. Range (°F)
Aluminum Alloy	Aging	250-460
Aluminum Alloy	Annealing	450-775
Aluminum Alloy	Forging	750-900
Aluminum Alloy	Heat treating	310-1000
Aluminum	Melting	1200-1400
Aluminum Alloy	Die casting	1250-1400
Antimony	Melting point	1166
Babbitt	Melting	600-800
Brass	Annealing	600-900
Brass	Extruding	1400-1450
Brass	Forging	1200-1400
Brass, Yellow	Melting	1705
Brass, Red	Melting	1830
Brick, Refractory	Burning	2500-3000
Bronze, 5% Alum.	Melting	1940
Bronze, Man.	Melting	1645
Bronze, Phos.	Melting	1920
Bronze, Tobin	Melting	1625
Cadmium	Melting point	610
Calcium	Melting point	1562
Cast Iron	Annealing	1600-1700
Cast Iron	Malleablizing	1650-1800
Cast Iron	Vitreous enameling	1200-1300
Clay, Refrac.	Burning	2200-2600
Cobalt	Melting point	2714
Coke	By-product oven	1830-2730
Copper	Annealing	800-1200
Copper	Refining	2100-2600
Copper	Melting	2100-2300
Copper	Smelting	2100-2600
Cores, Sand	Baking	250-550
Cupronickel, 15%	Melting	2150
Cupronickel, 30%	Melting	2240
Electrotype	Melting	740
Everdur 1010	Melting	1865
Gold	Melting	1950-2150
Iron	Blast furnace tap.	2500-2800
Iron, Malleable	Melting	2400-3100
Iron, Malleable	Annealing	1500-1700
Lead	Melting	620-750
Lead	Blast furnace	1650-2200
Lead	Refining	1800-2000
Magnesium	Aging	350-400
Magnesium	Heat treating	730-760
Magnesium	Melting	1250-1300
Magnesium	Superheating	1450-1650
Mercury	Melting point	-38
Molds, Foundry	Drying	400-750
Molybdenum	Melting point	4757
Monel Metal	Annealing	1100-1480
Monel Metal	Melting	2800
Muntz Metal	Melting	1660
Nickel	Annealing	1100-1480
Nickel	Melting	2650
Palladium	Melting point	2629
Phosphorous, Yellow	Melting point	111
Platinum	Melting	3224
Porcelain	Burning	2600
Potassium	Melting point	145
Silicon	Melting point	2606
Silver	Melting	1750-1900
Sodium	Melting point	208
Solder	Melting	400-600

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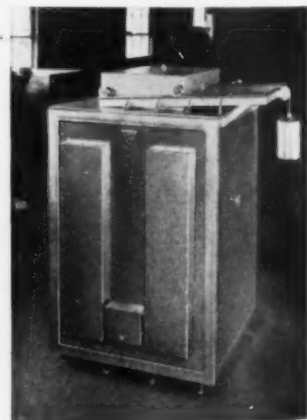
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Performance-Proved For  
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Pereco Electric Furnaces have proved themselves for years in production, pilot plant and laboratory use—for the leading names in the industrial and scientific world. Proved from every angle . . . in accuracy of temperature control—dependable long service life—easy, clean, and quiet operation—and freedom from fire and explosion hazard. All sizes, equipped with choice of controls. Write TODAY for catalog.



#### ILLUSTRATIONS

Upper: A Model TF-24 Porcelain Enameling Furnace with 36" w. x 48" d. x 24" h. firing chamber—2400° F.  
Lower: A 7 ft. high Pit Furnace for hot loading from hoist or conveyor with firing area 18" w. x 25" d. x 42" h.—2500° F.



**PERENY  
Equipment Co.**  
Dept. S, 893 Chambers Rd.  
Columbus 12, Ohio

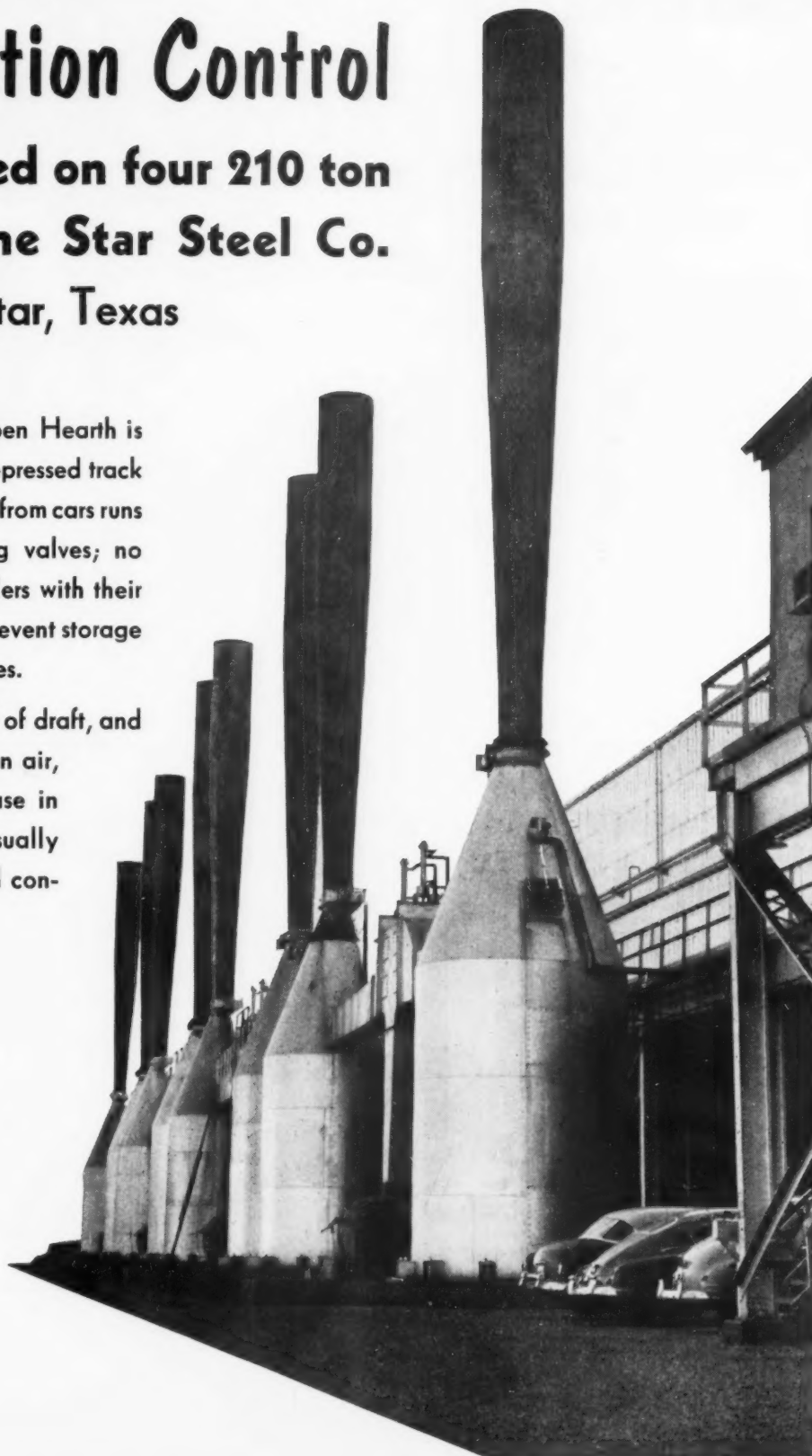


# Morgan-Isley Combustion Control

has been installed on four 210 ton  
furnaces at Lone Star Steel Co.  
Lone Star, Texas

The cellar of the Lone Star Open Hearth is a superintendent's dream. A depressed track to unload palletized refractories from cars runs from end to end. No reversing valves; no fans; no air piping, and no boilers with their auxiliaries to impede traffic or prevent storage of refractory materials and spares.

In addition, the absolute control of draft, and accurate metering of combustion air, with a possible generous increase in air temperature, makes for unusually high tonnage rates and low fuel consumption.



**MORGAN CONSTRUCTION COMPANY WORCESTER, MASS.**

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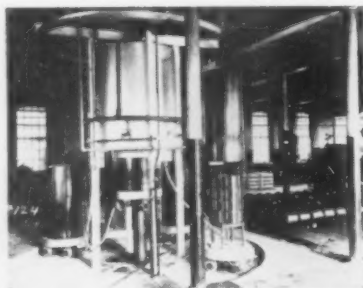
February 25, 1954

F-71

# KENWORTHY

1900 — 1954

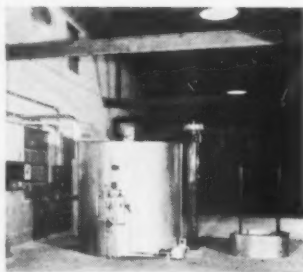
SPECIALISTS IN DESIGNING  
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FURNACES SINCE 1900



"Drinox" type bright annealing furnace for wire, strip, stampings, etc. Especially designed for fine wire or spools or in coils. Loading space 18" to 36" diameter—height to suit requirements.

Gas or Electric  
Automatic Control

ATMOSPHERE CONVERTERS  
325 CU. FT. TO 1000 CU. FT.



Rotating type single chamber, water seal, annealing furnace, steam atmosphere. For heavy sizes of copper wire and rod. Annealing space 38 1/2" dia. x 54" high. Capacity 4000 lbs.

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WATER SEAL FURNACES —  
CAPACITIES UP TO 10000 LBS.

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194 PIEDMONT ST. WATERBURY 6, CONN.

## —Temperature Ranges—

Continued

STEEL		
Steel, Sheet	Blue annealing	1400-1600
Sheet	Box annealing	1500-1700
Sheet	Bright annealing	1250-1350
Sheet	Job mill heating	2000-2100
Sheet	Mill heating	1800-2100
Sheet	Open annealing	1500-1700
Sheet	Tin plating	650
Sheet	Vitreous enameling	1400-1650
Sheet, Tin Plate	Box annealing	1200-1650
Sheet, Tin Plate	Hot mill heating	1800-2000
Sheet, Tin Plate	Lithographing	300
Steel	Bessemer converter	2800-3000
Steel	Calorizing	1700
Steel	Carburizing	1500-1700
Steel	Case hardening	1600-1700
Steel	Cyaniding	1400-1800
Steel	Drawing forgings	850
Steel	Drop forging	2200-2400
Steel	Forging	1700-2150
Steel	Form-bending	1800-1800
Steel	Galvanizing	800-900
Steel	Heat treating	700-1800
Steel	Lead hardening	1400-1800
Steel	Melting, openhearth	2800-3100
Steel	Melting, electric furn.	2400-3200
Steel	Normalizing	1650-1900
Steel	Rolling	2300
Steel	Soaking pits	1900-2100
Steel	Upsetting	2000-2300
Steel	Welding	2400-2600
Steel Bars	Heating	1900-2200
Steel Billets	Heating	2250
Steel Blooms	Heating	2250
Steel Bolts	Heating	2200-2300
Steel Castings	Annealing	1300-1600
Steel Flanging	Heating	1800-2100
Steel Ingots	Heating	2000-2200
Steel Nails	Blueing	650
Steel Pipe	Butt welding	2400-2600
Steel Rails	Hot bloom reheating	1900-2050
Steel Rivets	Heating	2000-2200
Steel Rod	Mill heating	1900-2100
Steel Shape	Heating	1900-2200
Steel Slabs	Heating	2000-2200
Steel Spikes	Heating	2000-2200
Steel Springs	Annealing	1500-1650
Steel Wire	Annealing	1200-1400
Steel Wire	Pot annealing	1650
Steel Wire	Baking	300-350
Steel, Alloy Tool	Hardening	1425-2150
Steel, Alloy Tool	Preheating	1200-1500
Steel, Alloy Tool	Tempering	325-1250
Steel, Carbon	Hardening	1360-1550
Steel, Carbon Tool	Hardening	1450-1500
Steel, Carbon	Tempering	300-1100
Steel, Carbon Tool	Tempering	300-550
Steel, Hi-Speed	Annealing	1400-1500
Steel, Hi-Speed	Hardening	2250-2375
Steel, Hi-Speed	Preheating	1450-1600
Steel, Hi-Speed	Tempering	1000-1150
Steel, S.A.E.	Annealing	1400-1650

Tin	Melting	500-650
Type Metal	Stereotyping	525-650
Type Metal	Linotyping	550-650
Type Metal	Electrotyping	650-750

Vitreous Enamel	Firing	1400-1700
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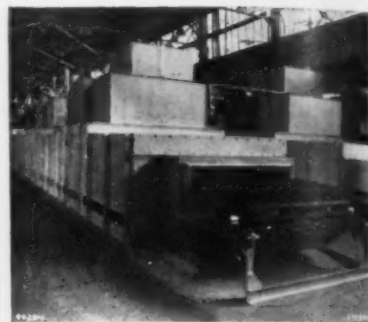
Zinc	Melting	800-900
Zinc Alloy	Die casting	850

XYZ  
FURNACE CO.



"No visitors, Miss Brunswick—I'm pouring over some new designs."

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INDUSTRIAL HEATING  
EQUIPMENT "CIRC-AIR"  
FURNACES ARE:

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MISERLY In regard to the number of normal rejects.

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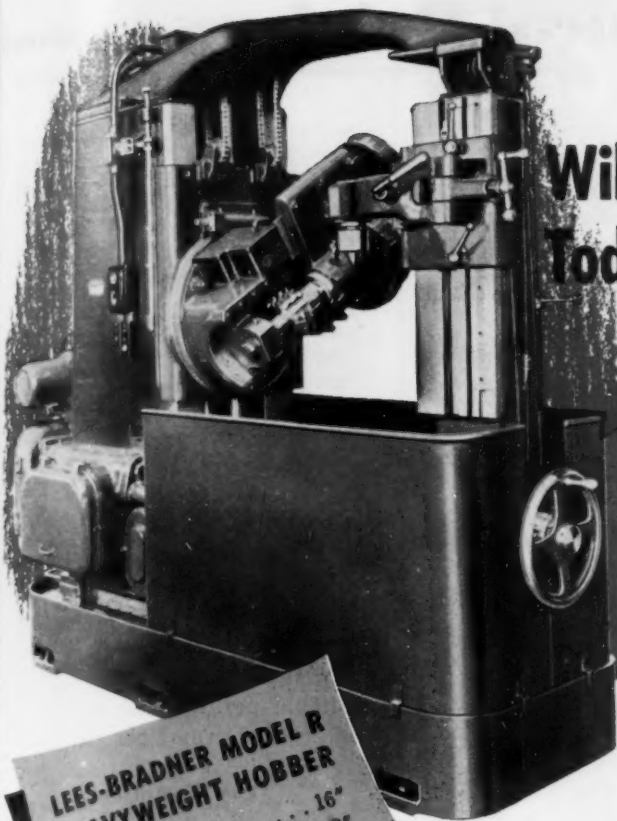
MONEY-GRUBBING In regard to fuel consumption.

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## Will the Machines You Buy Today Fill Tomorrow's Needs?



### LEES-BRADNER MODEL R HEAVYWEIGHT HOBBER

Maximum Outside Dia. . . . . 16"  
Travel . . . . . 18"  
Maximum Helix . . RH 45° - LH 60°  
Machine Weight . . . . 13,000 lbs.  
Motor Requirements . 15 to 25 HP

How about that machine you're thinking of replacing today? Awhile back it looked pretty good, didn't it? Good enough to fill your needs when you bought it, anyway. But now it can't handle today's job and it must be replaced.

When you buy that new machine—*look ahead*. Don't invest in one that just barely meets today's needs. Think about that extra capacity you'll probably need tomorrow.

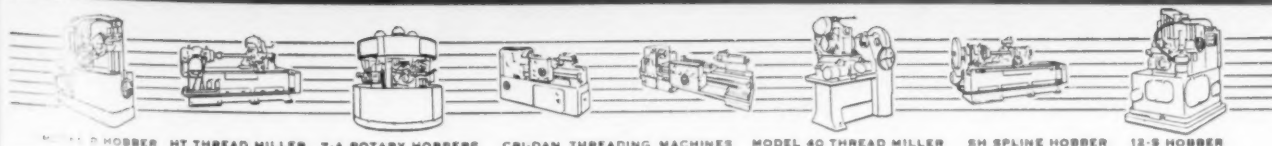
Lees-Bradner manufactures a full line of hobbing machines to meet different requirements. If a smaller capacity machine will do your job today — *and tomorrow* — fine, that's for you.

But if you suspect you'll need higher speeds, faster feeds and greater production capacity in the near future it's wise to gear your thinking and purchasing accordingly.



**CLEVELAND 11, OHIO, U.S.A.**





MODEL R HOBBER HT THREAD MILLER 7-A ROTARY HOBBER CRI-DAN THREADING MACHINES MODEL 40 THREAD MILLER SH SPLINE HOBBER 12-S HOBBER

IF YOU THREAD OR HOB . . . GET A BETTER JOB WITH A LEES-BRADNER



THE  
*Number One  
Name*  
In Socket Screws & Keys  
**ALLEN**



Don't take it for granted that any hex socket screw is an Allen. Your Allen Distributor *alone* can offer you

1. **ALLENPOINT SET SCREWS** with the new smaller point — proved by impartial laboratory tests to have greater locking power and vibration resistance, plus uniformly high shaft holding power, compared with conventional cup point screws and those with serrated or angled points.
2. **LEADER POINT CAP SCREWS**, for substantially reduced chance of thread injury or damage to threaded holes.
3. **ALLOY STEEL** — with the strength and temper to permit the use of smaller sizes, and make button head and flat head screws practical despite necessarily shallower sockets.
4. **ALLEN PROGRESSIVE PRESSUR-FORMING**, producing contoured uncut fiber flow, from head to point. A process originated and perfected by Allen.

Be sure to get Allens in the black and silver striped box, sold only through leading Industrial Distributors. Write us for technical information.



## Technical Briefs

Engineering

### Machining:

**Clamped carbide tooling cuts production costs.**

Greatly extended tool life was recently obtained at the Capitol Machine Co., Columbus, Ohio, a modern contract machine shop, by use of clamped tungsten carbide tooling for boring alloy iron, Bhn 210 to 230, truck brake drums.

Machining the 16.420-in. bore to a 7-in. depth on a Potter and Johnston turret lathe proved too tough for conventional brazed carbide tools first tried on this operation.

#### Too Much Heat

Because of excessive heat developed during the cut—which varies from  $\frac{1}{8}$  to  $\frac{1}{4}$ -in. depth due to run-out of the casting—only about 5 pieces could be bored per grind.

Now, with a tungsten carbide vertically clamped square insert tool, SBL-16A Kennamatic Grade K6, 20 to 25 drums are readily bored per indexible cutting edge. This represents about 6 miles of lineal cutting.

#### Ground Across Corners

Both the insert's back and side rake angles were changed to zero by grinding across its corners with holder in a grinder vise. Opera-



**Machining brake drums ...**

### IF YOU WANT MORE DATA

**You may secure additional information on any item briefed in this section by using the reply card on page 83. Just indicate the page on which it appears. Be sure to note exactly the information wanted.**

tion is handled at 0.024-in. feed per revolution and 240 sfpm.

Since four new edges are available on each end of the insert, 160 to 200 pieces are bored per grind. Approximately 20 regrinds are available per tool for a total of 3200 to 4000 drums per insert life.

#### Less Downtime

To determine tool cost per piece, cost of the holder is prorated over the life of six inserts. Tool cost per piece figures out to  $\frac{3}{8}$  of a cent.

In addition to providing this low boring cost, the clamped carbide tooling materially increased production by minimizing tool-changing downtime.

### Handling:

**Fork truck, crane combined to ease die removal.**

An overhead traveling bridge crane to raise and lower an 8000-lb capacity electric fork truck between basement and first floor have simplified a die handling problem at Perfection Stove Co., Cleveland.

With first-floor area needed for manufacturing operations and storage of frequently used dies, inactive die storage has been relegated to the basement.

#### Used Occasionally

Even though the use of these dies is somewhat infrequent, when needed they provide a serious handling problem since they are far too heavy for safe, efficient manual handling. Accordingly, a fork

truck has been assigned to these duties.

#### Crane Spots Truck

However, because the vehicle is only needed about once a week for such handling assignments, Perfection has called on the crane to spot the fork truck as required. In this way the vehicle is available for other assignments on the first floor.

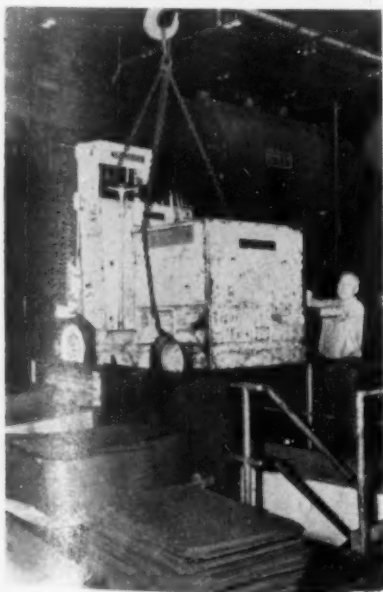
#### Dies Delivered to Well

Ramps and elevators leading to and from the basement are not available for truck travel, hence the crane. Once the truck is lowered to the basement it delivers the dies to the floor well where the crane picks them up and delivers them to the presses.

The truck is also used to place some dies in the presses but only those weighing under 8000 lb. For basement storage of dies, the reverse operation is initiated.

#### Fewer Accidents

For the company, the novel system has meant the freeing of needed production area, the safe, effective storage of dies, and handling methods that have diminished physical exertion and possible accidents to personnel.



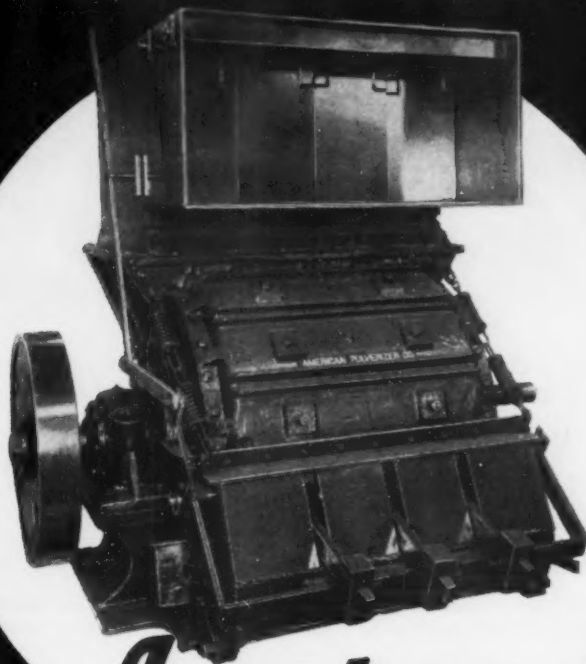
Truck takes to air . . .

Turn Page

February 25, 1954

# CASH IN YOUR CHIPS

Change Metal Turnings Waste  
into More Profitable Shoveling CHIPS



**American**  
METAL TURNINGS

**CRUSHERS**

No progressive, profit-conscious company—who produces 10 or more tons of metal turnings per month—can afford to ignore the profit potential of a modern chip salvage system . . . with an American Metal Turnings Crusher at the core.

American installation profits include: \$4 more per ton for chips than for machine turnings; up to 50 gallons per ton in cutting oil recovery; 75% less storage; easier, faster handling.

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#### THIS COULD BE YOUR PROFIT STORY FOR NEXT YEAR!

240 Tons Metal Turnings per Year . . . . .	\$ 960.00
(20 tons/month at \$4 extra per ton)	
6,000 Gallons Recovered Cutting Oil at 30¢/Gal. . . . .	\$1,800.00
(50 gals. per ton x 240 tons = 12,000 gals.	
Half of this, 6,000 gals., can be credited to use	
of chips instead of turnings in reclamation)	
Estimated Savings in Manpower, Storage, Tools,	
Maintenance, Freight, etc. . . . .	\$ 300.00
TOTAL GROSS PROFIT	\$3,060.00



WRITE for Metal Turnings Crusher Bulletin.

Originators and Manufacturers of Ring Crushers and Pulverizers

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... KEY TO SAVINGS



Basket centrifuge cylinders centrifugally cast in Monel Metal by Shenango. Used in superdehydrators for separating crystals given off from vacuum crystallizers.

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**2** You specify the job and Shenango will supply the part cast in the exact metal formula for maximum service under your specific conditions.

**3** Precision machining is done by skilled craftsmen in Shenango's mod-

ern machine shop. A good way to guarantee a perfect fit at minimum cost.

Send for Bulletin No. 150 covering nonferrous metal parts; Bulletin No. 151 covering Meehanite Metal, Ni-Resist and special iron alloys. Address...

### SHENANGO-PENN MOLD COMPANY

Centrifugal Castings Division

Dover, Ohio

Executive Offices: Pittsburgh, Pa.

# SHENANGO

ALL RED BRONZES • MANGANESE BRONZES • ALUMINUM BRONZES  
MONEL METAL • NI-RESIST • MEEHANITE® METAL

### Technical Briefs

## Welding:

**Steam-tight pocket made in stainless steel kettle.**

Fabrication of a steam-tight pocket in stainless steel kettles has been simplified by one manufacturer through use of a welding method which meets the exacting demands of his product.

Groen Mfg. Co., Chicago, makes steam-jacketed kettles in capacities from 10 gal and up for commercial and industrial use. The kettles are designed to utilize live steam circulated through an inner shell to provide an even and quick distribution of heat.



Less cleanup grinding...



Kettle revolves on jig...



## Technical Briefs

Heliarc welding used to weld a ring canopy to the top of the inner shell for the kettle. This canopy is designed to fit over the edge of the kettle jacket, to support the pot, and to form a steam tight pocket between the inner and outer shells. During welding the pot is mounted horizontally on a rotating jig.

### Rotated In Jig

One of the final fabricating touches in production is the spot-welding of a stainless steel name and specifications plate to the side of each kettle. Eight spot welds required on the 22-gage plate are completed in an average time of 30 seconds. Upon completion no grinding is necessary; the finished kettle unit needs only a high polish.



Nameplate spot welded ...

### Pipe Fitting Standards Revised

One of the most widely-used American Standards, Steel Pipe Flanges and Flanged Fittings, B16.5, has just been revised and supplemented because of new materials recently developed in this field.

The revision provides for fifteen different types of steel. It covers nominal pressures from 150 to 2500 psi, and includes references to valves.

Copies may be obtained from the American Standards Assn., Inc., 70 East 45 Street, New York 17, N. Y. at \$3.00 a copy.

Turn Page

# What's in this NAME? KENDEX\*

It's the Trade-Name  
for Multiple-edge,  
Indexable, Tungsten  
Carbide Insert  
Tools Produced by  
Kennametal Inc.



## EXCLUSIVE FEATURES

1. *Made of Kennametal*—Kendex inserts have its uniform high hardness and exceptionally long life.
2. *Multiple, precision-ground cutting edges*—enabling a clean, sharp edge to be kept against the work continuously.
3. *Screw-mounted*—can be accurately indexed to a new cutting position, in seconds, without removing tool shank from holder.

## OPERATING ADVANTAGES

1. *Minimize downtime for tool changing*—major cause of high-cost operation.
2. *Eliminate tool grinding*—no regrinding; Kendex inserts are thrown away when all cutting edges have been used.
3. *"Balanced" tool budget*—it's penny-wise and pound foolish to "save" money by excessive reconditioning of old tools, when you can keep new cutting edges on the job continuously with Kendex inserts.

Ask your nearest Kennametal representative for details. Kennametal Inc., Latrobe, Pa.

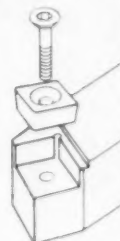
\*Registered Trade-Marks

## How KENDEX\* Works



Hard, strong, wear-resistant Kennametal is molded into square, round, or triangular Kendex inserts, which are precision ground.

2



Kendex inserts are mounted to suitable tool holders with socket head screws.

3



When edge becomes dull, insert is turned to new cutting position. When all cutting edges have been used, insert is thrown away; no regrinding.

# KENNAMETAL\*

CEMENTED CARBIDE TOOLING  
THAT INCREASES PRODUCTIVITY

SALES OFFICES IN PRINCIPAL CITIES



## Maintenance:

### Disassembly of steam control valves simplified.

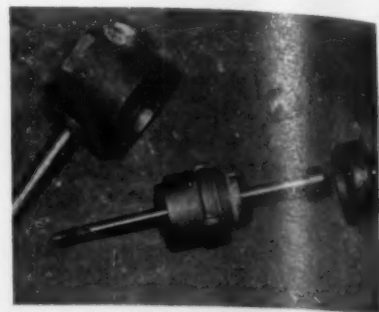
Taking apart steam control valves used on high pressure turbines has been simplified at the San Francisco Naval Shipyard with devices developed by yard employees.

Chief problem in disassembly

was to remove the valve disk from cap without damaging the parts. Improper methods of getting the two apart often caused scoring of the disk and the cap.

### Use Keys In Cap

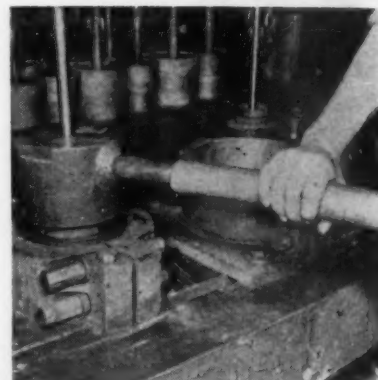
Employees solved the problem by developed special tools. The assembly is placed in a special holding device which is then locked down. Keys are inserted on the



Steam valve parts . . .



Disassembly tools . . .



Wrench fits cap, keys . . .



Device holds valve . . .

# Cowles DRYORTH\*

**Anhydrous Sodium Orthosilicate**  
**High-powered Cleaning at Low Cost**

• Cowles DRYORTH is free-flowing, granular, dust-free. It contains not less than 60%  $\text{Na}_2\text{O}$  and is quickly and completely soluble.

DRYORTH is a fast, economical cleaner for

- ★ strip and sheet steel
- ★ steel pipe — before galvanizing
- ★ heavy ferrous parts and castings

Try DRYORTH for these and other basic cleaning operations. DRYORTH — anhydrous sodium orthosilicate — assures long cleaning mileage at low cost.

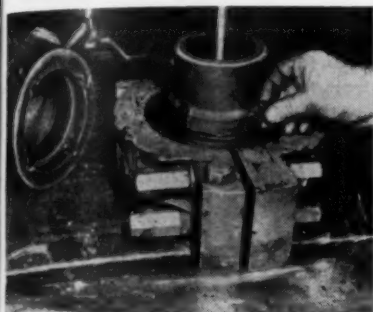
\*Reg. U. S. Pat. Off.

Cowles also manufactures a complete line of cleaners engineered to handle all kinds of cleaning problems on both ferrous and non-ferrous metals. The Cowles Technical Man in your area will be glad to discuss any metal cleaning problems you have. Write us today!

**COWLES  
CHEMICAL  
COMPANY**

7016 Euclid Avenue  
Cleveland 3, Ohio

cap in the necessary locating spots. After the keys are inserted, a special wrench of proper size is placed over the cap from the valve disk. The unit can then be disassembled with ease. Two holding devices covering valve sizes from 2 to 9 in. in diam are used. Shims are used to get the exact holding device sizes needed.



Keys in cap for grip . . .

## Deburring:

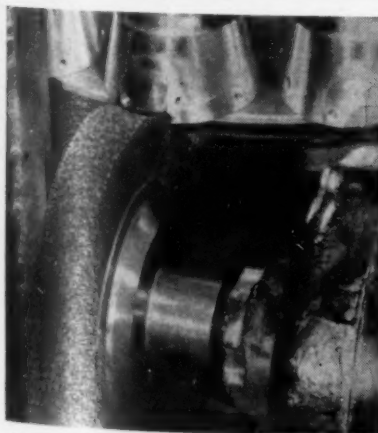
Power brushing speeds operation 300 pct.

A power brushing method for removing feather burrs from a machined slot in an aluminum fuse component has increased production by more than 300 pct at Gilman Engineering & Mfg. Corp., Janesville, Wis.

### Build Machine

Hand methods previously used for doing this job, yielded output of 360 units per hour. Not only was this hand operation too slow, but results were not uniform and left poorly finished edges.

With the help of power brush-



Removes feather burrs . . .

ing specialists from The Osborn Mfg. Co., Cleveland, Gilman engineers constructed a rotating brushing machine equipped with three Osborn 0.005 in. wire wheel brushes. There are 16 spindles on the table. The aluminum fuse parts do not rotate, they rest on the pins. The table rotates clockwise at two revolutions per minute, while the brushes run at 3450 rpm.

First brush in position rotates clockwise against the slot. Next brush in position rotates counter-clockwise to brush the other side of the slot edge. A third brush sweeps down through the slot to finish the bottom edge. Slots come clean and smooth, at a rate of 1400 units per hour, an increase of 1040 units of higher quality.

Turn Page



These three examples of special tooling are picked from GAIRING's engineering files to show typical instances of the work in which GAIRING has excelled for over 35 years • Regardless of your requirements, from stock counterbores to special tooling of the most complex nature, call on us • Ask us to have one of our representatives get in touch with you. These men, located throughout the country, are well qualified to discuss your tooling problems with you.

## The GAIRING Tool Company

21224 Hoover Road • Detroit 32, Michigan

In Canada: A. C. Wickman (Canada) Ltd., Queensway, Toronto 14



## Heat Measurement:

### Paints used to indicate temperature studied.

A series of chemical compounds, used like paint, will effectively measure temperatures from 50° to 278°C, scientists of the Naval Research Laboratories have reported. Studies on pigments and paints used for measuring temperatures were recently reported by J. E.

Cowling, Head of the Paint Section, Protective Coatings Branch, Naval Research Laboratory.

Of the scores of compounds tested, best results were obtained from coordination complexes of cobaltous salts with ammonia, hydroxylamine, hexamethylenetetramine, pyridine, ethylenediamine, and hydrazine.

Many of the complexes of cobalt have not as yet been tested, but are regarded as promising. A few additional useful temperature-sen-

sitive pigments have been yielded by compounds of nickel, chromium and copper.

### Effective Pigments

These include: Cobaltous pyridine arsenate, 50°C; nickelous hexamethylenetetramine bromide<sup>1</sup>, 62°C; cobaltous hexamethylenetetramine thiocyanate, 74°C; cobaltous acetate, 82°C; cobaltous

<sup>1</sup> This change not permanent. Reading must be made shortly after temperature is lowered.

pyridine thiocyanate, 93°C; cobaltous silicofluoride, 99°C; cobaltous citrate, 110°C; cobaltous formate, 116°C.

Properly plasticized methacrylate resins have proven ideal vehicles for low and medium temperatures. Most of the successful temperature-indicating paints have been prepared with this resinous material. As research continues toward lighter temperatures, more stable vehicles such as silicones will then be used.

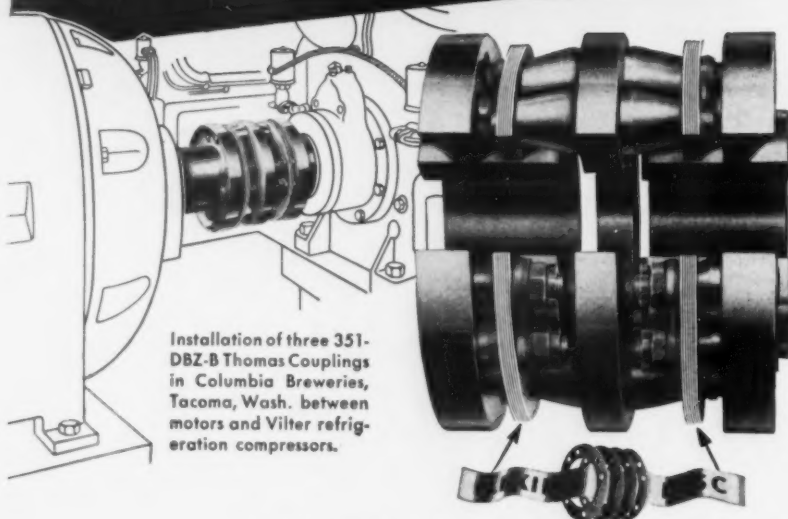
### Increases Hiding Strength

Experiments already undertaken have turned to such things as adding white pigment to increase hiding strength and to enhance the physical qualities of the paint. In most cases it was expedient to reduce the final product to low viscosity so very thin films could be painted on test strips.

While the investigators at NRL have not been concerned with crayons, such as are marketed under the trade name "Thermochrom," these materials enjoy some advantages over paint. Crayon marks change color in a second or two when the temperature index of the particular crayon is reached. It is a simple matter to make a series of marks not only on surfaces, but on a machine part, a fragile object, etc. Under test, the marks change color in sequence as the temperature rises and thus give a close approximation of the temperature gradient.

Temperature-indicating paints can be used handily in places where it would be most difficult to introduce thermocouples or surface pyrometers. If a heat exchanger should be located in a

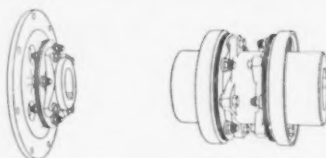
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NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



THOMAS COUPLINGS ARE MADE FOR A WIDE RANGE OF SPEEDS, HORSEPOWER AND SHAFT SIZES.



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**THOMAS FLEXIBLE COUPLING COMPANY**  
Largest Exclusive Coupling Manufacturer in the World  
WARREN, PENNSYLVANIA, U.S.A.

## Technical Briefs

**Paints can be used to show up heat patterns quickly, map surface temperature . . .**

place where access is limited by machinery or a structural obstacle, it might not be too much of a problem to daub some temperature-indicating paint at critical spots.

Another advantage to be gained by the use of paint comes from the ease with which it can be used to cover completely a relatively large area. In service testing, the paint on areas covered might tend to show up spots of heat in odd shapes and sizes that would take painstaking hours to indicate with conventional instruments.

### "Map" Surface Temperature

Ability of temperature-indicating paints to "map" temperatures of surfaces is particularly advantageous in recording the results of dynamic tests on jet engines and rockets, information which is usually much more vital than the results of static tests. Normally such data cannot be gained by means of the usual temperature-indicating instruments.

As in many cases of NRL research, results on these paints will readily translate into benefits for industry and for other laboratories. In ranges up to 200°C there are likely uses for the paints in organizations working with paper, textiles, rubber, and synthetics. Chemical and electrical equipment also commonly operate in temperatures up to 200°C.

### Needs Outlined

If paints effective up to temperatures of 450°C could be developed, these would be useful to manufacturers with processes or products involving zinc, aluminum, and glass. Then at higher temperature ranges, where imported paints have already proved to be reliable indicators, there is a long list of potential users including iron and steel fabrication, welding establishments, foundries, and enamelling works.

Turn Page

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## Cut Production Time and Costs



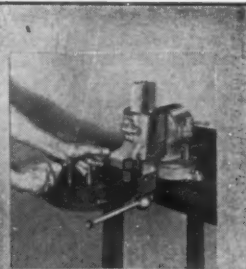
A Production Worker on the Bench Who is Never on Your Payroll!

## with FLEXIVISE

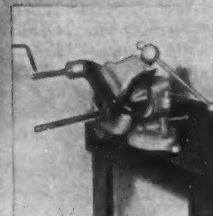
A revolutionary development that saves time, labor and fatigue. Provides complete rotation of 360° in any direction. Positions work to the operator, saving time, labor and physical fatigue. Flexivise is exactly what the name implies; a flexible vise providing a greater range and greater efficiency. 4" jaw width, 5½" jaw opening. Write or wire now for complete information.

**FLEXIVISE COMPANY**

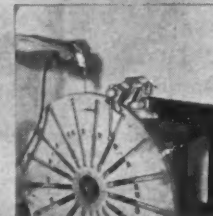
1149 E. Pico Blvd., Los Angeles, Calif.



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...you will want to be well informed on modern Group Welfare protection as designed by the Sun Life. The benefits of Life, Sickness, Accident, Disability and Pension insurance are available to groups of 25 or more persons regardless of age and other conditions which often preclude such protection under individual plans.

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Without cost or obligation please send me your pamphlet outlining the modern way of securing Life, Sickness, Accident, Disability and Pension Benefits through the Group Welfare Plans designed by the Sun Life of Canada.

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## — Technical Briefs —

### New Books:

**Basic studies in controls aid engineer.**

Rapidly widening interest in automatic controls as applied to manufacturing operations has placed greater responsibility on the engineer and requires a broader knowledge of the subject. Texts on controls are evoking wide interest.

"Principles of Automatic Controls," by F. E. Nixon. Written for the practicing engineer, the book presents a comprehensive review of automatic controls, system design, and methods. It is one of the first books to include data on transient analysis, use of computers and numerical integrations, as well as frequency response analysis methods. Prentice-Hall, Inc., 70 Fifth Ave., New York. \$9.35. 409 p.

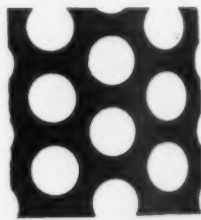
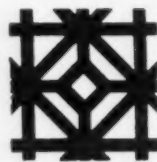
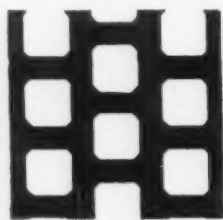
"Mechanical Vibration," by G. W. van Santen. Discusses theory of vi-

bration phenomena. The book will be of interest to many readers concerned with problems arising from vibration. Offers a guide to solution of problems encountered in research and engineering laboratories. Elsevier Press, Inc., 155 East 82nd St., New York 28, N. Y. \$7.50. 296 p.

"Modern Electroplating," edited by A. G. Gray. An up-to-date presentation of electroplating theory and practice written by 39 experts. Includes virtually all plating practices currently in use. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. \$8.50. 563 p.

"ASME Handbook, Metals Engineering Design," edited by O. J. Horger. Brings together important reference data on the design function in metals engineering. Forty-eight sections, each dealing with factors or properties relating to design, are discussed, each by an expert in the field. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. \$10.00. 405 p.

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Available in any desired shape or size of perforations, rugged Hendrick Perforated Plate can also be supplied in any gauge of high carbon, stainless steel and many other commercially rolled metals for a specific screening application. If the fabrication of your product calls for perforated metal screens of any type, get in touch with Hendrick. For more details phone or write, today!

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tectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids



## Research:

### Steam condenser built to study heat transfer.

Improved commercial condenser design is expected to result from studies made with an experimental surface type steam condenser recently built by Allis-Chalmers Mfg. Co., Milwaukee. The unit will be used to accumulate heat transfer data.

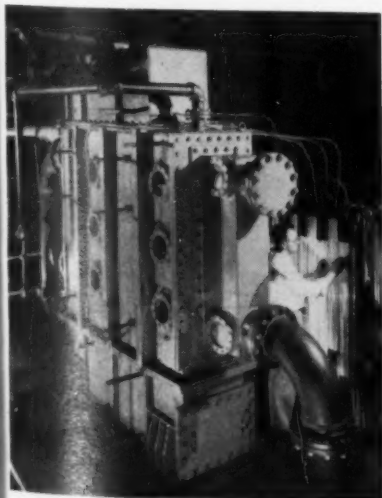
Outwardly of unconventional design, the unit's interior represents a typical section of tubes taken from a full size condenser of the type and design produced by Allis-Chalmers.

#### Removable Tube Bundle

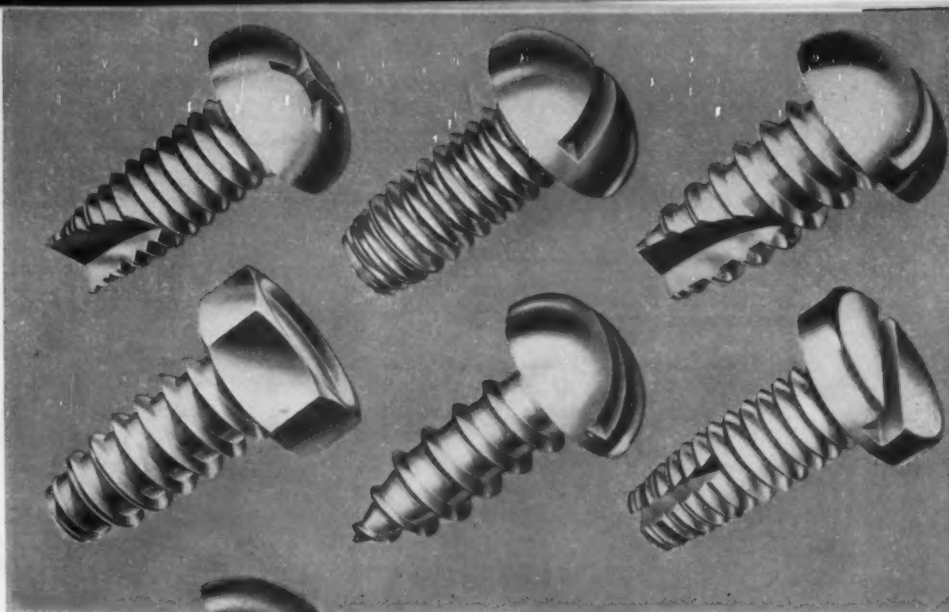
Design permits adaptation to various tube and baffle arrangements as well as different tube sizes and materials. Through the use of a removable type tube bundle, tests can be run which will allow the investigation of the heat transfer characteristics of a series of varied tube configurations.

Initial tests will use 280 5/8-in. diam tubes to give a total effective surface area of 276 sq ft. Surface available in the condenser will then vary as different size tubes and tube configurations are used.

It is believed to be the first time that studies on condenser tube spacing, tube vibration, pressure drop through the steam space, and baffling arrangements have been made on this scale.



Build better bundle . . .



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Townsend tapping screws are available in the types shown here in a variety of head styles with slotted or Phillips recessed and hex heads. They are but one group of the Townsend family of 10,000 types of standard and special fasteners and small parts used by all industry to improve assembly and speed production.

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# THE IRON AGE SUMMARY...

- ◄ No hint of decline seen in steel market
- ◄ New orders are actually coming faster
- ◄ But scrap prices take another beating

The steel market gives no hint that the nation's economy is going to fall flat on its face. Quite the contrary, it lends solid support to the "rolling adjustment" theory of the Eisenhower Administration.

Steelmaking operations have held a steady pace within the narrow range of 74 to 75.5 pct of rated capacity since the first of the year. And the industry is expected to hold that pace—possibly even gain slightly—during the next few months.

That's a pretty good rate of production. In terms of tons it has been exceeded by only three years in the history of the industry, 1950, 1951, and 1953.

Steel is considered a bellwether industry because current steel orders usually reflect future manufacturing operations of its customers.

Readjustment in the steel market started as long ago as last May when a few customers started to correct heavy inventories. It soon became apparent that the "correction" was to become industry-wide. Then the manufacturing climate cooled a bit, and steel order cutbacks became deeper and lasted longer than some had expected.

Now the big order backlogs of last year have just about melted away. Any decline in new business would have to show up in the production rate very quickly.

Yet a check of the all-important rate of new orders gives no sign of further decline in steel production. Current bookings of most firms are higher than they have been for the past 2 or 3 months.

Individual steel orders are smaller today than they were a year ago, reflecting customers' desire to hold inventories in check. This holds true at both mill and warehouse levels. In some cases warehouses are urging users to buy small quantities in the hope that they can increase their share of business.

Competition is the strongest factor in the market today. And price and service are the key

words in steel selling. Both mills and warehouses are going all out to give the customer what he wants when he wants it.

But that doesn't mean that the steel buyer's job has become easy. Alert purchasing is paying off today, just as aggressive procurement did when the market was tight.

Although steelmakers have heard some talk of a spring upturn in auto production, they are not counting on much increase in buying from their No. 1 customer. They feel that some of the recent upturn in auto buying is a strike hedge, and not geared to production. They cite scarcity of warehouse space in Detroit as evidence that some firms are holding "protective stocks" as well as regular inventory.

Even a short strike could change the market picture in a hurry. One of the first things it would do would be to wipe out price concessions.

Scrap prices took another shellacking this week. THE IRON AGE Steel Scrap Composite Price fell \$1.00 a ton to \$24.33 per gross ton.

## Steel Output, Operating Rates

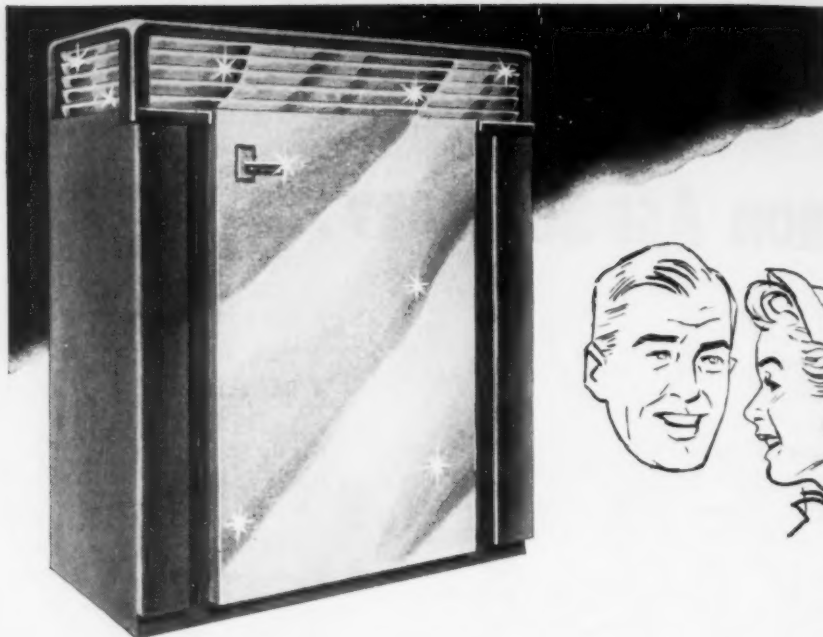
	This Week†	Last Week	Month Ago	Year Ago
Net Tons Produced (000 omitted)	....	1,772	1,802	2,240
Ingot Production Index (1947-49=100)	....	110.3	112.2	139.4
District Operating Rates				
Chicago	80.0	82.5	84.0	103.0
Pittsburgh	89.0	89.0	88.0	106.0
Philadelphia	76.0	76.0	78.0	96.0
Valley	75.0	72.0	74.0	101.0
West	79.0	79.5	76.5	107.0
Detroit	73.0	73.0	83.0	105.0
Buffalo	70.5	75.0	71.0	94.0
Cleveland	69.0	73.0*	74.0	95.0
Birmingham	80.0	80.0	87.0	98.5
S. Ohio River	79.0	73.5	76.0	92.5
Wheeling	80.0	80.0*	74.0	102.0
St. Louis	35.5	35.5	48.0	93.5
East	73.0	74.5*	59.0	104.0
Aggregate	74.0	74.0	74.0	100.5

Per cent of capacity for weeks in 1954 is based on annual capacity of 124,330,410 net tons as of Jan. 1, 1954. Per cent of capacity for last year is based on annual capacity of 117,547,470 tons as of Jan. 1, 1953.

\* Revised.

† Tentative.





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When your sales staff can point out to distributors and jobbers that your brightwork is genuine ENDURO Stainless Steel . . . when distributors can tell dealers . . . when dealers can tell their customers . . . and housewives can tell one another . . . then you've got them all talking sales! Republic will help you choose proper ENDURO Types and fabricating procedures. *Write:*

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# Markets at a Glance

**Prices For Large Pipe . . .** National Tube and Consolidated Western Steel divisions of U. S. Steel Corp. have published f.o.b. mill prices for electric-welded pipe in sizes from 24 to 36 in. Producing points are McKeesport, Pa., Orange, Tex., Los Angeles and San Francisco, Calif. The companies have been producing large diameter pipe for several years but prices were not published until production standards could be established. The newly published prices approximate those in effect on current contracts, and apply to all outstanding quotations and new orders.

**Freight Rates To Drop . . .** Barring an unexpected suspension by the Interstate Commerce Commission, eastern railroads will put new, motor-competitive steel freight rates into effect March 26. Some of the new rates will be more than 20 pct below existing tariffs. The new rate scales reflect the railroads determination to win back iron and steel business lost to truckers in recent years.

**Hold 1953 Iron Ore Prices . . .** Substantial tonnages of iron ore for delivery in the 1954 shipping season have been sold by the Cleveland Cliffs Iron Co. to several large steel companies, it was announced last week. The company's 1954 prices per gross ton, which are firm for the season, are the same as the 1953 end-of-season prices for standard grades of iron ore of 51.5 pct natural iron content delivered at rail of vessel at lower Lake ports.

**Relining Job . . .** Blast furnace No. 3 at the National Works of U. S. Steel Corp. was shut down on February 15 for a complete relining.

**Steep Rock Bonds Sold . . .** The Export-Import Bank of Washington has just sold \$5.7 million worth of 4½ pct first mortgage bonds of Steep Rock Iron Mines, Ltd., to the New York branch of Dominion Securities Corp., Ltd., and A. E. Ames & Co., Ltd., both of Toronto. These firms recently bought the \$4.3 million principal amount of Steep Rock's first mortgage bonds from the Reconstruction Finance Corp.

**Carloadings Down . . .** Loading of revenue freight for the week ended February 6 totaled 624,385 cars, according to the Association of American Railroads. This figure represented a decrease of 66,228 cars, 9.6 pct below the corresponding week in 1953, and a decrease of 109,534 cars, or 14.9 pct below the corresponding week in 1952.

**Magnesium Price Drop . . .** A reduction in the price of magnesium tread plate will become effective with shipments on or after March 1, The Dow Chemical Co. announced. The tread plate is the first production plate from Dow's Madison, Ill., mill. The new tread plate prices will be 59¢ per lb for thicknesses of ¼ in. and above, 60¢ per lb in 3/16 in. gage and 63¢ per lb in 1/8 in. The quantity extra price schedule is now being revised.

**Construction Hits High . . .** Activity in the construction field shows strong gains, counteracting the trend in other industries, according to F. W. Dodge Corp. reports which show an all-time high in award of total building and engineering contracts for January in the 37 eastern states. Contract awards totaled \$1,151,987,000 for the month, a 7 pct gain over January 1953 and a 28 pct increase above the same period in 1952. Non-residential building showed the greatest gain with a \$473,077,000 total, 16 pct above the January '53 figure. Engineering contracts totaled \$216,428,000, an increase of 4 pct, while residential awards were 1 pct ahead of last January with a \$462,482,000 total.

**Steel Output Up . . .** Canadian production of steel ingots made a new alltime high record in 1953 totaling 4,010,000 net tons, a gain of 12 pct over the previous record in 1952 of 3,578,000 tons. Daily average for the year was 10,986 tons against 9777 tons in 1952. Ingot production was at a new record, and imports of rolled steel products declined for the second year in succession. Demand for rolled products continued active almost to the end of 1953 but shortly before the year-end, reductions in inventories cut buying.

## Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
<b>Composite prices</b>				
Finished Steel, base . . . . .	4.634	4.634	4.634	4.376
Pig Iron (gross ton) . . . . .	\$56.59	\$56.59	\$56.59	\$55.26
Scrap, No. 1 hvy. (gross ton) . . . . .	\$24.33	\$25.33	\$27.67	\$44.00
<b>Nonferrous</b>				
Aluminum, ingot . . . . .	21.50	21.50	21.50	20.50
Copper, electrolytic . . . . .	29.75	29.75	29.75	24.50
Lead, St. Louis . . . . .	12.30	12.80	12.80	13.30
Magnesium, ingot . . . . .	27.75	27.75	27.75	24.50
Nickel, electrolytic . . . . .	63.08	63.08	63.08	63.08
Tin, Straits, N. Y. . . . .	84.75	85.25	84.75	\$1.21½
Zinc, E. St. Louis . . . . .	9.25	9.25	9.50	11.50

## May Sell Velasco Magnesium Plant

**Contract for Dow operation of government-owned facility ends June 30 . . . May be renewed . . . But U. S. wants to put "For Sale" sign up . . . Who'll buy it?—By R. L. Hatschek.**

The government wants to get out of the magnesium business. That fact was confirmed when a Washington official told THE IRON AGE that the government would like to put the Velasco, Tex., reduction plant up for sale.

This plant is the only government-owned magnesium operation still producing. Five others were deactivated last June 30 as stockpile, military and civilian demands could be filled without their output. Dow Chemical Co., which is producing magnesium at its own Freeport plant, is running the adjacent Velasco operation under government contract.

**Mothball Painesville Plant . . .** Office of Defense Mobilization has recently ordered mothballing for the Diamond magnesium plant at Painesville, Ohio. This layaway process had already been set for government plants at Canaan, Conn., Wingdale, N. Y., Manteca, Calif., and Spokane, Wash.

Reason for delaying the layaway at Painesville hasn't been revealed. It's fairly certain, however that the government had been considering the plant's reactivation. General Services Administration writes off reactivation reports as "wild rumors"—but remember

that the Painesville plant, unlike the others that went out of production, is an economic producer.

**New Power Plant . . .** Another convenience of the Painesville plant is that Cleveland Power & Light Co. last year completed a brand new power plant not very far from the Diamond operation. These factors make the Painesville plant a likely possibility as a commercial competitor in the Dow-dominated industry.

But it's Velasco that GSA wants to put up on the block. An efficient producer for Dow, it might not be for any other company. It's situated just across the Brazos River from the huge Dow works at Freeport, where production is not limited to magnesium.

Velasco is not completely independent of the Freeport works—which might shove the cost too high for efficient competition. Power is one such area.

**Could Be Dow . . .** In view of this, Dow itself would be a logical buyer for the plant. Contract for running it expires on June 30 and Dow has the option of renewing it, provided the government still has a magnesium program going for "stockpiling and other defense needs."

The company itself says that it "doesn't know if it wants to buy the plant or not."

This isn't too surprising for a firm that's in the odd position of being an unwilling monopoly. Dow would like some competition—but nobody seems willing to give it to them. And while magnesium's long-term trend is definitely upward, the industry is going slowly at the moment.

**More Titanium Cuts . . .** Following last week's price cuts by one company, Rem-Cru Titanium, Inc., has announced a new price schedule. Cuts have been put into effect on bars, billets, sheet and plate with the promise that new prices on other items such as strip and wire will be set some time in the future. Present cuts range up to 14 pct.

Previous prices were on an item basis; the new list is set up on actual production costs, states Rem-Cru. All customers are to benefit from the lower list, which went into effect last Friday.

**Lead Price Off . . .** Once again the domestic lead market has followed the trend set in London. Action came last Thursday when a leading custom smelter brought its price down to 12.50¢ per lb New York, a cut of 1/2¢. Other smelters and producers followed.

Buyers, meanwhile, continued to eye London Metal Exchange quotations and purchased only enough metal to fill immediate needs. On Friday, the London prompt quotation stood at the delivered New York equivalent of 12.25¢—still 1/4¢ below the domestic price.

**Set Up Committee . . .** Mining state members of the House of Representatives have set up a four-man group to see what can be done for the ailing lead-zinc mining industry. President Eisenhower has given the job of watching the industry to White House economist Dr. Gabriel Hauge.

### NONFERROUS METAL PRICES

(Cents per lb except as noted)

	Feb. 17	Feb. 18	Feb. 19	Feb. 20	Feb. 22	Feb. 23
Copper, electro, Conn. . . . .	29.50-	29.50-	29.50-	29.50-	....	29.50-
	30.00	30.00	30.00	30.00	....	30.00
Copper, Lake delivered . . . . .	30.00	30.00	30.00	30.00	....	30.00
Tin, Straits, New York . . . . .	85.25	85.00	84.75	....	....	84.75*
Zinc, East St. Louis . . . . .	9.25	9.25	9.25	9.25	....	9.25
Lead, St. Louis . . . . .	12.80	12.30	12.30	12.30	....	12.30

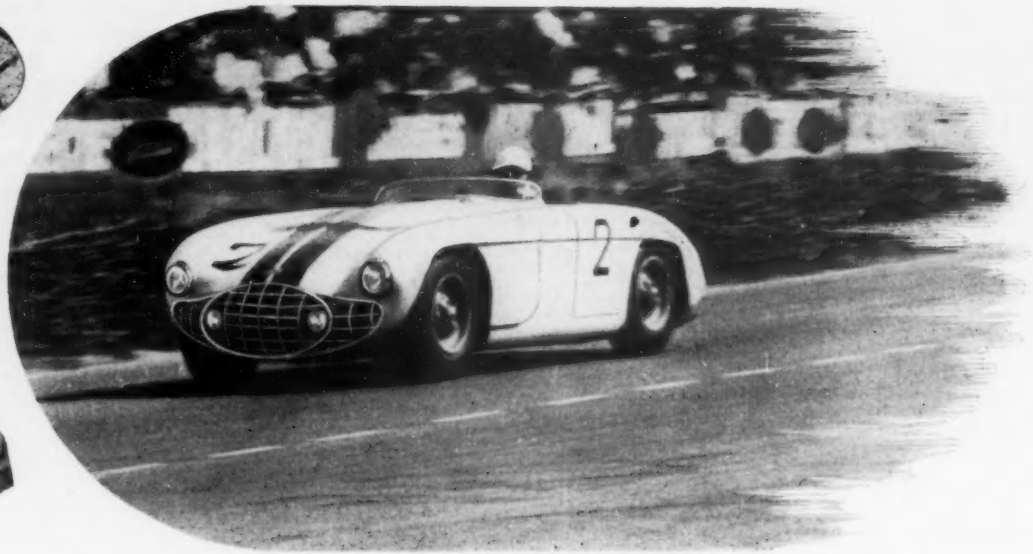
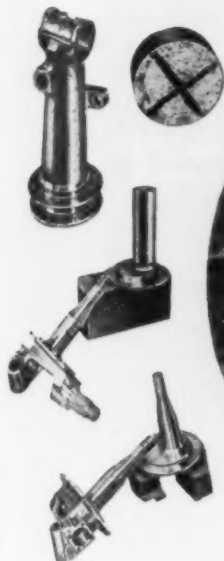
Note: Quotations are going prices

\*Tentative



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Courtesy: B. S. Cunningham Co.

Clocked at 154 mph, this American Cunningham won top honors in its class at Le Mans, France. Expert driving—plus expert design—brought home the bacon.

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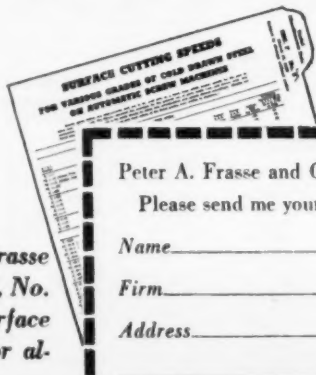
To meet rigid design specifications, the maker consulted Frasse Technical Service. Frasse engineers prescribed a heat treated, 40 carbon

alloy—shipped direct from warehouse stock. Axles, spindles, brake parts, steering arms—all vital parts—were machined from Frasse steels. The result attests to their perfect performance.

When you're faced with an alloy problem—let Frasse know-how prescribe for you. Frasse alloy steels include all the popular grades—in a wide range of sizes—and Frasse Technical Service stands ready to assist you in their application. Why not let this combination help make your product a winner?

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February 25, 1954

# Nonferrous Prices

(Effective Feb. 22, 1954)

## MILL PRODUCTS

(Cents per lb, unless otherwise noted)

### Aluminum

(Base 30,000 lb, f.o.b. ship. pt. allowed)

Flat Sheet: 0.136 in. and thicker, 2S, 3S, 35.9¢; 4S, 36.0¢; 52S, 38.2¢; 24S-O, 24S-OAL, 37.0¢; 75S-O, 75S-OAL, 44.7¢; 0.081-in., 2S, 3S, 35.1¢; 4S, 37.7¢; 52S, 39.9¢; 24S-O, 24S-OAL, 38.4¢; 75S-O, 75S-OAL, 46.9¢. 0.032-in., 2S, 3S, 37.0¢; 4S, 41.8¢; 24S-O, 24S-OAL, 46.9¢; 75S-O, 75S-OAL, 58.4¢.

Plate, ¼-in. and heavier: 2S-F, 3S-F, 32.4¢; 4S-F, 34.5¢; 52S-F, 36.2¢; 61S-O, 35.6¢; 24S-O, 24S-OAL, 36.9¢; 75S-O, 75S-OAL, 44.3¢.

Extruded Solid Shapes: Shape factors 1 to 5, 36.5¢ to 82.8¢; 12 to 14, 37.2¢ to 99.0¢; 24 to 26, 39.9¢ to 112.9¢; 36 to 38, 47.2¢ to 118.9¢.

Rod, Rolled: 1.064 to 4.5-in., 2S-F, 3S-F, 43.8¢ to 37.2¢; cold-finished, 0.375 to 3.499-in., 2S-F, 3S-F, 47.6¢ to 39.3¢.

Screw Machine Stock: Rounds, 11S-T3, ½ to 11/32-in., 59.6¢ to 47.0¢; ¾ to 1½-in., 46.6¢ to 48.5¢; 1 9/16 to 3-in., 42.7¢ to 39.9¢. Base 8000 lb.

Drawn Wire: Coiled 0.051 to 0.374-in., 2S, 44.1¢ to 32.4¢; 52S, 53.4¢ to 39.1¢; 17S-T4, 40.1¢ to 41.8¢; 61S-T4, 53.9¢ to 41.3¢.

Extruded Tubing: Rounds, 63S-T5, OD 1¼ to 2-in., 31.6¢ to 60.7¢; 2 to 4 in., 37.7¢ to 51.1¢; 4 to 6 in., 38.2¢ to 46.6¢; 6 to 9 in., 38.7¢ to 48.8¢.

Roofing Sheet: Flat, per sheet, 0.032-in., 42% x 60 in., \$2.838; x 96 in., \$4.543; x 120 in., \$5.680; x 144 in., \$6.816. Coiled sheet, per lb, 0.019 in. x 28 in.

### Magnesium

(F.o.b. mill, freight allowed)

Sheet and plate: F51-O¼ in., 66¢; 5/16 in., 68¢; ¾ in., 70¢; B & S Gage 10, 71¢; 12, 75¢. Specifications grade higher. Base: 30,000 lb.

Extruded Round Rod: M, diam ¼ to 0.311 in., 77¢; ½ to ¾ in., 60.5¢; 1¼ to 1.749 in., 66¢; 2½ to 5 in., 51.5¢. Other alloys higher. Base up to ¼ in. diam, 10,000 lb; ¼ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes: Rectangles: M. In weight per ft, for perimeters less than size indicated: 0.10 to 0.11 lb, 3.5 in., 65.3¢; 0.22 to 0.25 lb, 5.9 in., 62.3¢; 0.50 to 0.59 lb, 8.6 in., 59.7¢; 1.8 to 2.59 lb, 19.5 in., 56.8¢; 4 to 6 lb, 28 in., 52¢. Other alloys higher. Base, in weight per ft of shape: Up to ¼ lb, 10,000 lb; ¼ to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: M, 0.049 to 0.057 in. wall thickness: OD, ¼ to 5/16 in., \$1.43; 5/16 to ¾ in., \$1.29; ¾ to 1 in., 96¢; 1 to 2 in., 79¢; 0.166 to 0.219 in. wall: OD, ¾ to 1 in., 64¢; 1 to 2 in., 60¢; 3 to 4 in., 59¢. Other alloys higher. Base, OD: Up to 1½ in., 10,000 lb; 1½ to 3 in., 20,000 lb; over 3 in., 30,000 lb.

### Titanium

(10,000 lb base, f.o.b. mill)

Commercially pure and alloy grades: Sheets and strip, HR or CR, \$15; Plate, HR, \$12; Wire, rolled and/or drawn, \$10; Bar, HR or forged, \$6; Forgings, \$6.

### Nickel, Monel, Inconel

(Base prices, f.o.b. mill)

	"A" Nickel Monel	Inconel
Sheet, CR	86¼	67¼
Strip, CR	92¼	70¼
Rod, bar	82¼	65¼
Angles, HR	82¼	65¼
Plate, HR	84¼	66¼
Seamless Tube	115¼	100¼
Shot, blocks	60	60

### Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Extruded Shapes
Copper	46.41		48.48
Copper, h-r	48.38	44.73	
Copper, drawn		45.98	
Low brass	44.47	44.41	
Yellow brass	41.72	41.66	
Red brass	45.44	45.38	
Naval brass	45.76	40.07	41.33
Leaded brass			39.11
Comm. bronze	46.95	46.89	
Mang. bronze	49.48	43.62	46.18
Phos. bronze	66.58	67.08	
Muntz metal	43.96	39.77	41.02
Ni silver, 10 pct	55.36		62.63

## PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed	21.50
Aluminum pig	20.00
Antimony, American, Laredo, Tex.	23.50
Beryllium copper, per lb cont'd Be	\$40.00
Beryllium aluminum 5% Be, Dollars	
per lb contained Be	\$72.75
Bismuth, ton lots	\$2.25
Cadmium, del'd	\$1.70
Cobalt, 97-99% (per lb)	\$2.60 to \$2.67
Copper, electro, Conn. Valley	29.50 to 30.00
Copper, Lake, delivered	30.00
Gold, U. S. Treas., dollars per oz.	\$35.00
Indium, 99.8%, dollars per troy oz.	\$2.25
Iridium, dollars per troy oz.	\$165 to \$175
Lead, St. Louis	12.30
Lead, New York	12.50
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb, pig	27.00
Ingot	27.75
Magnesium, sticks, 100 to 500 lb.	46.00 to 48.00
Mercury, dollars per 76-lb flask, f.o.b. New York	\$188 to \$191
Nickel electro, f.o.b. N. Y. warehouse	63.08
Nickel oxide sinter, at Copper Creek, Ont., contained nickel	56.25
Palladium, dollars per troy oz.	\$22 to \$24
Platinum, dollars per troy oz.	\$90 to \$92
Silver, New York, cents per oz.	85.25
Tin, New York	84.75
Titanium, sponge	\$5.00
Zinc, East St. Louis	9.25
Zinc, New York	9.75
Zirconium copper, 50 pct	\$6.20

## REMELTED METALS

### Brass Ingot

(Cents per lb delivered carloads)

85-5-5-5 ingot	
No. 115	23.50
No. 120	22.75
No. 123	22.25
80-10-10 ingot	
No. 305	27.75
No. 315	25.50
88-10-2 ingot	
No. 210	36.50
No. 215	33.00
No. 245	28.50
Yellow ingot	
No. 405	19.75
Manganese bronze	
No. 421	24.25

### Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper, max.	22.00-22.25
0.60 copper, max.	21.75-22.00
Piston alloys (No. 122 type)	18.75-19.50
No. 12 alum. (No. 2 grade)	18.25-19.00
108 alloy	19.00-19.50
195 alloy	20.50-21.00
13 alloy (0.60 copper max.)	21.75-22.00
ASX-679	19.00-19.50

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—96-97¼%	19.50-20.00
Grade 2—92-95%	18.00-19.00
Grade 3—90-92%	17.00-17.50
Grade 4—85-90%	15.50-16.50

## ELECTROPLATING SUPPLIES

### Anodes

(Cents per lb, freight allowed, 5000 lb lots)

Copper	
Cast, oval, 15 in. or longer	44.54
Electrodeposited	38.38
Flat rolled	47.14
Brass, 80-20	
Cast, oval, 15 in. or longer	43.515
Zinc, flat cast	20.25
Ball, anodes	18.50
Nickel, 99 pct plus	
Cast	84.00
Cadmium	\$1.75
Silver 999 fine, rolled, 100 oz. lots, per troy oz, f.o.b. Bridgeport, Conn.	94%

### Chemicals

(Cents per lb, f.o.b. shipping points)

Copper cyanide, 100 lb drum	63.90
Copper sulfate, 99.5 crystals, bbl.	12.85
Nickel salts, single or double, 4-100 lb bags, frt. allowed	30.00
Nickel chloride, 375 lb drum	38.00
Silver cyanide, 100 oz. lots, per oz.	75%
Sodium cyanide, 96 pct domestic	
200 lb drums	19.25
Zinc cyanide, 100 lb drum	54.30

## SCRAP METALS

### Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	26	25¼
Yellow brass	19¼	18
Red brass	23	22¼
Comm. bronze	23½	23¼
Mang. bronze	18¼	17¼
Yellow brass rod ends	19¼	

### Custom Smelters' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	24
No. 2 copper wire	23¼
Light copper	21
*Refinery brass	20
*Dry copper content	

### Ingot Makers' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	24	24¼
No. 2 copper wire	22¼	23
Light copper	21	21¼
No. 1 composition	17¼	18
No. 1 comp. turnings	17	17
Rollad brass	14¼	15¼
Brass pipe	15	16
Radiators		13¼

### Aluminum

Mixed old cast	10¼—11
Mixed new clips	12—12¼
Mixed turnings, dry	10¼—11¼
Pots and pans	10¼—11

### Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

### Copper and Brass

No. 1 heavy copper and wire	22¼—23
No. 2 heavy copper and wire	20¼—21
Light copper	18¼—19
New type shell cuttings	18—18¼
Auto radiators (unsweated)	11¼—12
No. 1 composition	15¼—16
No. 1 composition turnings	15—15¼
Unlined red car boxes	13—13¼
Cocks and faucets	13—13¼
Mixed heavy yellow brass	10—10¼
Old rolled brass	12¼—13
Brass pipe	14¼—15
New soft brass clippings	15¼—16
Brass rod ends	12¼—13
No. 1 brass rod turnings	10¼—11

### Aluminum

Alum. pistons and struts	5—6
Aluminum crankcases	8—9
2S aluminum clippings	11—11¼
Old sheet and utensils	8—9
Borings and turnings	6—6
Misc. cast aluminum	8—9
Dural clips (24S)	9—10

### Zinc

New zinc clippings	4¼—5
Old zinc	3¼—3½
Zinc routings	1¼—2¼
Old die cast scrap	2¼—3

### Nickel and Monel

Pure nickel clippings	60—65
Clean nickel turnings	40
Nickel anodes	60—65
Nickel rod ends	60—65
New Monel clippings	22—24
Clean Monel turnings	14—15
Old sheet Monel	20—22
Nickel silver clippings, mixed.	31
Nickel silver turnings, mixed.	31

### Lead

Soft, scrap, lead	9—9¼
Battery plates (dry)	4¼—5¼
Batteries, acid free	8

### Magnesium

Segregated solids	20—21
Castings	19—20

### Miscellaneous

Block tin	65—67
No. 1 pewter	40—42
No. 1 auto babbitt	37—38
Mixed common babbitt	37—38
Solder joints	11—12
Siphon tops	35
Small foundry type	12¼
Monotype	11¼
Lino. and stereotype	30
Electrotype	30
Hand picked type shells	4
Lino. and stereo. dross	2¼
Electro dross	

• **NON-FERROUS METALS**

• **ORES AND MINERALS**

• **METALLIC RESIDUES**

• **METAL SCRAP**

• **FERRO ALLOYS**

• **ZINC**

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February 25, 1954



## Has Market Finally Hit Bottom?

**Trade starting to believe price nosedive nearing end . . . More dealers storing scrap against future orders . . . Offerings low at current prices . . . Japanese market reported weaker.**

Despite further declines in scrap prices in most districts, there are several indications that the bottom of the market has been reached. Dealers are starting to buy scrap and store it against future orders at what the trade swears will have to be higher prices. And some mill purchasing agents have told THE IRON AGE that little scrap is being offered at lower prices.

Pricewise the market continued sad, with THE IRON AGE Steel Scrap Composite Price off another dollar to \$24.33. Very little scrap was moving anywhere across the country, and the few sales made were almost without exception at lower prices.

Talk of exports is dying down. On the West Coast, dealers and brokers reported that even the Japanese market was drying up. And latest government figures show that Japan continues to be the biggest foreign buyer of U. S. iron and steel scrap. U. S. Commerce Dept. as of Feb. 12 had approved first quarter export of 57,083 net tons of scrap to Japan. Shipments totaling 37,484 tons were approved for export to Mexico, and 10,090 tons were licensed for shipment to Yugoslavia by the government, bringing first quarter 1954 shipments to a total of 104,657 tons licensed as of Feb. 12.

**Pittsburgh**—On basis of a sale in an adjacent consuming area, openhearth scrap dropped \$2 per ton this week. This established a price of \$25 top for No. 1 heavy melting steel. Other grades also were off, excepting rails, railroad specialties and cast. The market here is within \$4 of the 1949 low for No. 1 heavy melting, leading some observers to believe it may be touching bottom. Without question, a substantial purchase would move prices upward, but there is no indica-

tion of consumer interest for February and perhaps March.

**Chicago**—Scrap remained dormant in absence of any sales of representative tonnages. There was some indication that the drop on asking prices had begun to slow. It is notable that at least some yards were beginning to buy and put in storage. This doesn't argue for an upturn particularly but indicates that the falloff in prices in steelmaking grades is expected to slow. Mill purchasing agents report that despite low purchasing on their part there is little scrap being offered to them at lower asking prices. Railroad grades were at least holding their own along with steelmaking grades.

**Philadelphia**—Only mill doing any regular buying in this district has trimmed another \$1 per ton from its buying prices for steelmaking scrap. Resistance to the low prices is increasing—with one railroad refusing to sell its scrap and with more dealers laying material down. Prospects for March are bleak.

**New York**—Lack of business and a price decline in a neighboring consuming district depressed prices on steelmaking and blast furnace grades another \$1 here. The trade is extremely pessimistic, sees little relief for some time. Cast continues to move at previous prices.

**Detroit**—Month-end inactivity characterized the Detroit market with the approach of closing date for industrial lists. Little buying or selling ever precedes list closing as the trade waits for the bidding to establish price patterns. Prices are based on market sentiment and a few token sales. The downward trend still prevails and the moderate changes reflect market inactivity rather than any stabilizing force. Prices for No. 1 and No. 2 bundles and low phos punchings, plate as of Feb. 16 were incorrectly listed

in the issue of Feb. 18. Correct prices for those grades were \$19.00-\$20.00, \$16.00-\$17.00, and \$18.00-\$19.00 respectively.

**Cleveland**—Valley low phos fell off \$2 to \$28.00 on the basis of a sale and No. 1 heavy melting slipped \$1 to \$25 in sympathy with the sale and activity in an adjoining area. Cleveland market was nominally unchanged just before bidding on industrial lists started. A few dealers are considering averaging prices downward as dollar balances melt. Mills still show no inclination to buy.

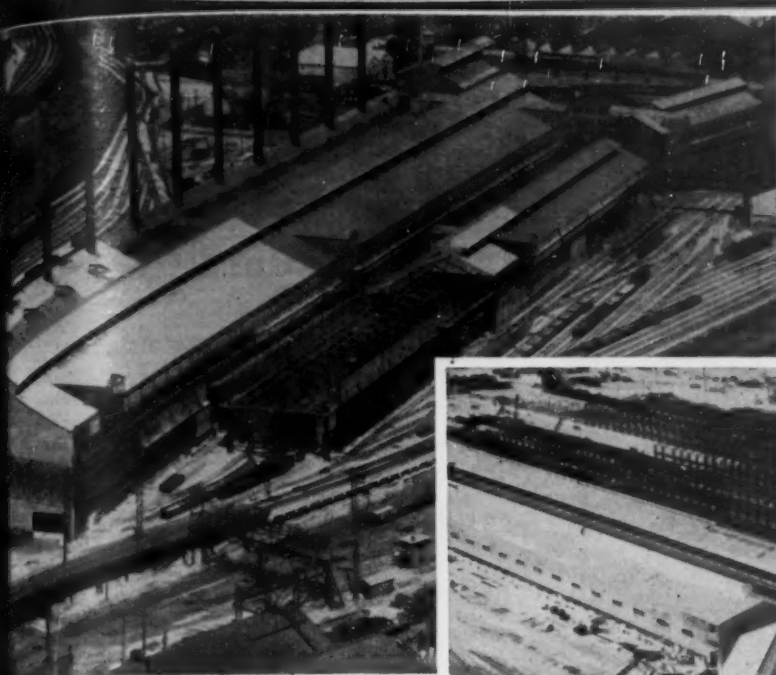
**Cincinnati**—Brokers and dealers here are marking time until March buying schedules come out within the next few days. Mill buyers report inventories still high. Apparently there is still no end to depressed condition of the market in sight.

**Boston**—New England scrap market is termed "dead" by members of the trade. Nothing is moving, they say, and the situation is worse than it was before—which was plenty bad enough. Steelmaking scrap prices tumbled up to \$2 per ton this week. Most other prices held steady.

**West Coast**—Even Japanese export market was beginning to slow up last week due to eager shipments from California. About 40,000 tons have gone out since lifting of controls and about another 40,000 are contracted for but not shipped. Only one major area producer buying steadily but not enough to bolster overall market. California dealers are getting deeper into financial difficulty. Cast market in San Francisco is still firm but continuing weaker in Los Angeles where the No. 1 cupola range slipped \$2 to \$37-\$38 last week.

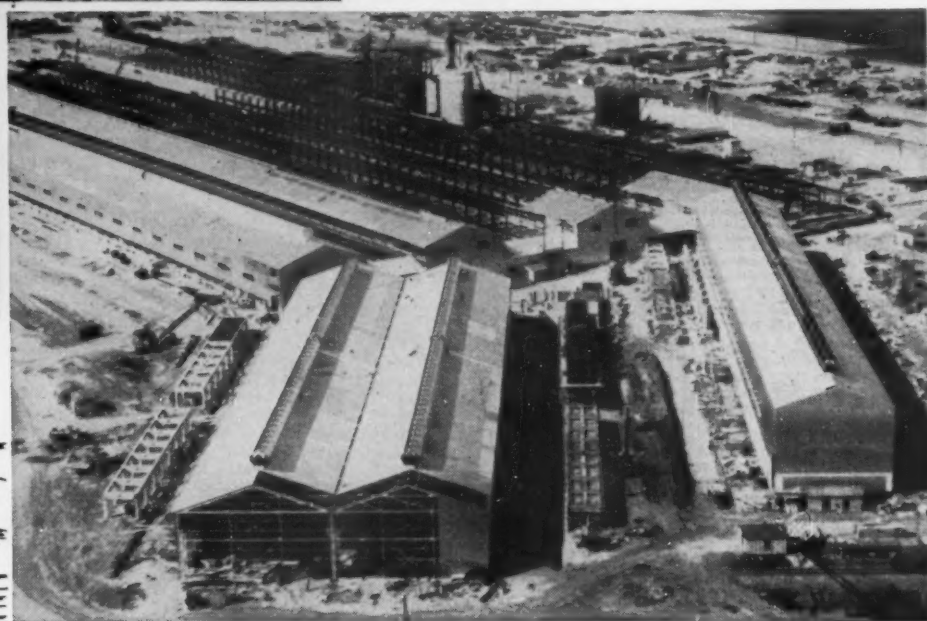
**Buffalo**—While steelmaking grades declined another dollar, cast and shoveling turnings moved up a dollar on a scattering of small sales. Cast advance is attributed to shrinkage in supplies. General market continues soft. Drop in ingot rate is chief source of worry to dealers.

**St. Louis**—Local market continues dull. Because of lack of buying, some prices were down \$1 to \$2 a ton, while others were nominally unchanged.



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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

# AMERICAN BRIDGE



UNITED STATES STEEL

# Scrap Prices

(Effective Feb. 23, 1954)

## Pittsburgh

No. 1 hvy. melting	\$24.00 to \$25.00
No. 2 hvy. melting	21.00 to 22.00
No. 1 bundles	24.00 to 25.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and ms. turns	10.00 to 11.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Low phos. punch'gs, plate	27.00 to 28.00
Heavy turnings	21.00 to 22.00
No. 1 RR. hvy. melting	26.00 to 27.00
Scrap rails, random lgth.	37.00 to 38.00
Rails 2 ft and under	43.00 to 44.00
RR. steel wheels	33.00 to 34.00
RR. spring steel	33.00 to 34.00
RR. couplers and knuckles	33.00 to 34.00
No. 1 machinery cast.	41.00 to 42.00
Cupola cast.	34.00 to 35.00
Heavy breakable cast.	29.00 to 30.00
Malleable	27.00 to 28.00

## Chicago

No. 1 hvy. melting	\$24.00 to \$26.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 factory bundles	26.00 to 28.00
No. 1 dealers' bundles	22.00 to 24.00
No. 2 dealers' bundles	19.00 to 20.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	9.00 to 10.00
Shoveling turnings	11.00 to 12.00
Cast iron borings	11.00 to 12.00
Low phos. forge crops	32.00 to 33.00
Low phos. punch'gs, plate	29.00 to 31.00
Low phos. 3 ft and under	28.00 to 29.00
No. 1 RR. hvy. melting	28.00 to 29.00
Scrap rails, random lgth.	30.00 to 31.00
Rerolling rails	36.00 to 37.00
Rails 2 ft and under	38.00 to 40.00
Locomotive tires, cut	32.00 to 33.00
Cut bolsters & slide frames	32.00 to 33.00
Angles and splice bars	34.00 to 35.00
RR. steel car axles	37.00 to 38.00
RR. couplers and knuckles	32.00 to 34.00
No. 1 machinery cast.	33.00 to 35.00
Cupola cast.	30.00 to 31.00
Heavy breakable cast.	25.00 to 26.00
Cast iron brake shoes	32.00 to 33.00
Cast iron car wheels	29.00 to 31.00
Malleable	36.00 to 37.00
Stove plate	24.00 to 26.00

## Philadelphia Area

No. 1 hvy. melting	\$23.00 to \$24.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 bundles	22.00 to 23.00
No. 2 bundles	18.00 to 19.00
Machine shop turn.	12.00 to 13.00
Mixed bor. short turn.	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Shoveling turnings	18.00 to 19.00
Clean cast chem. borings	24.00 to 25.00
Low phos. 5 ft and under	25.00 to 27.00
Low phos. 2 ft and under	26.00 to 28.00
Low phos. punch'gs	26.00 to 28.00
Elec. furnace bundles	24.00 to 25.00
Heavy turnings	21.00 to 22.00
RR. steel wheels	29.00 to 30.00
RR. spring steel	29.00 to 30.00
Rails 18 in. and under	39.00 to 40.00
Cupola cast.	34.00 to 35.00
Heavy breakable cast.	35.00 to 37.00
Cast iron car wheels	38.00 to 39.00
Malleable	39.00 to 40.00
Unstripped motor blocks	27.00 to 28.00
No. 1 machinery cast.	38.00 to 40.00
Charging box cast.	35.00 to 36.00

## Cleveland

No. 1 hvy. melting	\$22.00 to \$23.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 bundles	22.00 to 23.00
No. 2 bundles	18.00 to 19.00
No. 1 busheling	22.00 to 23.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Low phos. 2 ft and under	25.00 to 26.00
Drop forge flashings	22.00 to 23.00
No. 1 RR. heavy melting	28.00 to 29.00
Rails 3 ft and under	43.00 to 44.00
Rails 18 in. and under	44.00 to 45.00
Railroad grate bars	27.00 to 28.00
Steel axle turnings	24.00 to 25.00
Railroad cast.	40.00 to 41.00
No. 1 machinery cast.	41.00 to 42.00
Stove plate	35.00 to 36.00
Malleable	40.00 to 41.00

## Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

## Youngstown

No. 1 hvy. melting	\$24.00 to \$25.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 bundles	24.00 to 25.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	12.00 to 13.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Low phos. plate	27.00 to 28.00

## Buffalo

No. 1 hvy. melting	\$23.00 to \$24.00
No. 2 hvy. melting	19.50 to 20.50
No. 1 busheling	23.00 to 24.00
No. 1 bundles	25.00 to 26.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	12.50 to 13.50
Mixed bor. and turn.	14.50 to 15.50
Shoveling turnings	16.50 to 17.50
Cast iron borings	14.50 to 15.50
Low phos. plate	28.00 to 29.00
Scrap rails, random lgth.	31.00 to 32.00
Rails 2 ft and under	39.00 to 40.00
RR. steel wheels	34.00 to 35.00
RR. spring steel	34.00 to 35.00
RR. couplers and knuckles	34.00 to 35.00
No. 1 machinery cast.	34.00 to 35.00
No. 1 cupola cast.	30.00 to 31.00

## Detroit

Brokers' buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$17.00 to \$18.00
No. 2 hvy. melting	14.00 to 15.00
*No. 1 bundles, openhea'h	18.50 to 19.50
†No. 2 bundles	14.00 to 15.00
New busheling	17.00 to 18.00
Drop forge flashings	17.00 to 18.00
Machine shop turn.	5.00 to 6.00
Mixed bor. and turn.	7.00 to 8.00
Shoveling turnings	7.00 to 8.00
Cast iron borings	7.00 to 8.00
**Low phos. punch'gs, plate	18.00 to 19.00
No. 1 cupola cast.	35.00
Heavy breakable cast.	24.00
Stove plate	28.00
Automotive cast.	35.00
*Price for Feb. 16 was...	19.00 to 20.00
†Price for Feb. 16 was...	16.00 to 17.00
**Price for Feb. 16 was...	18.00 to 19.00

## St. Louis

No. 1 hvy. melting	\$25.00 to \$26.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 bundles	25.00 to 26.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	7.00 to 8.00
Cast iron borings	9.00 to 10.00
Shoveling turnings	9.00 to 10.00
No. 1 RR. hvy. melting	28.50 to 29.50
Rails, random lengths	30.00 to 32.00
Rails, 18 in. and under	38.00 to 39.00
Locomotive tires, uncut	29.00 to 30.00
Angles and splice bars	31.00 to 32.00
Std. steel car axles	35.00 to 36.00
RR. spring steel	31.00 to 32.00
Cupola cast.	36.00 to 37.00
Hvy. breakable cast.	24.00 to 25.00
Cast iron brake shoes	30.00 to 31.00
Stove plate	27.00 to 28.00
Cast iron car wheels	29.00 to 30.00
Malleable	34.00 to 35.00
Unstripped motor blocks	24.00 to 25.00

## New York

Brokers' buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$15.00 to \$16.00
No. 2 hvy. melting	12.00 to 13.00
No. 2 bundles	10.00 to 11.00
Machine shop turn.	4.00 to 5.00
Mixed bor. and turn.	6.00 to 7.00
Shoveling turnings	7.00 to 8.00
Clean cast chem. borings	18.00 to 19.00
No. 1 machinery cast.	35.00 to 36.00
Mixed yard cast.	29.00 to 30.00
Charging box cast.	29.00 to 30.00
Heavy breakable cast.	29.00 to 30.00
Unstripped motor blocks	22.00 to 23.00

## Birmingham

No. 1 hvy. melting	\$20.00
No. 2 hvy. melting	18.00
No. 1 bundles	20.00
No. 2 bundles	17.00
No. 1 busheling	20.00
Machine shop turn.	13.00
Shoveling turnings	15.00
Cast iron borings	15.00
Electric furnace bundles	\$28.00 to 29.50
Bar crops and plate	30.00
Structural and plate, 2 ft.	30.00
No. 1 RR. hvy. melting	26.00 to 27.00
Scrap rails, random lgth.	34.00
Rails, 18 in. and under	40.00
Angles & splice bars	37.00
Std. steel axles	34.00
No. 1 cupola cast.	41.00 to 42.00
Stove plate	38.00 to 39.00
Cast iron car wheels	34.00 to 35.00
Charging box cast.	24.00 to 25.00
Heavy breakable	25.00 to 26.00
Unstripped motor blocks	32.00 to 33.00
Mashed tin cans	15.00 to 16.00

## Boston

Brokers' buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$13.00 to \$14.00
No. 2 hvy. melting	10.00 to 11.00
No. 1 bundles	11.00 to 12.00
No. 2 bundles	8.00 to 9.00
No. 1 busheling	10.00 to 11.00
Elec. furnace, 3 ft & under	13.00 to 14.00
Machine shop turn.	2.00
Mixed bor. and short turn.	2.00 to 3.00
Shoveling turnings	5.00 to 6.00
Clean cast chem. borings	13.00 to 14.00
No. 1 machinery cast.	27.00 to 28.00
Mixed cupola cast.	23.00 to 24.00
Heavy breakable cast.	25.00 to 26.00
Stove plate	20.00 to 21.00
Unstripped motor blocks	7.00 to 8.00

## Cincinnati

Brokers' buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$23.00 to \$24.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 bundles	23.00 to 24.00
No. 2 bundles	18.00 to 19.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	13.50 to 14.50
Shoveling turnings	13.50 to 14.50
Cast iron borings	13.50 to 14.50
Low phos., 18 in. & under	31.00 to 32.00
Rails, random lengths	36.00 to 37.00
Rails, 18 in. and under	44.00 to 45.00
No. 1 cupola cast.	36.00 to 37.00
Hvy. breakable cast.	31.00 to 32.00
Drop broken cast.	42.00 to 43.00

## San Francisco

No. 1 hvy. melting	\$20.00
No. 2 hvy. melting	16.00
No. 1 bundles	19.00
No. 2 bundles	16.00
No. 3 bundles	12.00
Machine shop turn.	5.00
Cast iron borings	9.00
No. 1 RR. hvy. melting	23.00
No. 1 cupola cast.	\$39.00 to 40.00

## Los Angeles

No. 1 hvy. melting	\$20.00
No. 2 hvy. melting	16.00
No. 1 bundles	19.00
No. 2 bundles	16.00
No. 3 bundles	12.00
Machine shop turn.	5.00
Shoveling turnings	\$7.00 to 9.00
Cast iron borings	7.00 to 9.00
Elec. fur. 1 ft and under	25.00
No. 1 RR. hvy. melting	20.00
No. 1 cupola cast.	\$37.00 to 38.00

## Seattle

No. 1 hvy. melting	\$25.00
No. 2 hvy. melting	21.00
No. 1 bundles	22.00
No. 2 bundles	16.00
No. 3 bundles	12.00
No. 1 cupola cast.	37.00
Mixed yard cast.	35.00

## Hamilton, Ont.

No. 1 hvy. melting	\$26.00
No. 2 hvy. melting	23.00
No. 1 bundles	26.00
No. 2 bundles	21.00
Mixed steel scrap	20.00
Bushelings	21.00
Bush., new fact prep'd.	24.00
Bush., new fact unprep'd.	20.00
Short steel turnings	15.00
Mixed bor. and turn.	15.00
Rails, remelting	35.00
Cast scrap	42.00



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February 25, 1954

# Comparison of Prices

(Effective Feb. 23, 1954)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Feb. 23 1954	Feb. 16 1954	Jan. 26 1954	Feb. 24 1953
<b>Flat-Rolled Steel: (per pound)</b>				
Hot-rolled sheets	3.925¢	3.925¢	3.925¢	3.775¢
Cold-rolled sheets	4.775	4.775	4.775	4.575
Galvanized sheets (10 ga.)	5.275	5.275	5.275	5.075
Hot-rolled strip	3.925	3.925	3.925	3.725
Cold-rolled strip	5.513	5.513	5.513	5.20
Plate	4.10	4.10	4.10	3.90
Plates wrought iron	9.30	9.30	9.30	9.00
Stain's C-R strip (No. 302)	41.50	41.50	41.50	36.75*
<b>Tin and Terneplate: (per base box)</b>				
Tinplate (1.50 lb.) cokes	\$8.95	\$8.95	\$8.95	\$8.95
Tinplate, electro (0.50 lb.)	7.65	7.65	7.65	7.65
Special coated mfg. terns	7.75	7.75	7.75	7.75
<b>Bars and Shapes: (per pound)</b>				
Merchant bars	4.16¢	4.16¢	4.16¢	3.95¢
Cold finished bars	5.20	5.20	5.20	4.925
Alloy bars	4.875	4.875	4.875	4.675
Structural shapes	4.10	4.10	4.10	3.85
Stainless bars (No. 302)	35.50	35.50	35.50	31.50*
Wrought iron bars	10.40	10.40	10.40	10.05
<b>Wire: (per pound)</b>				
Bright wire	5.525¢	5.525¢	5.525¢	5.225¢
<b>Rails: (per 100 lb.)</b>				
Heavy rails	\$4.325	\$4.325	\$4.325	\$3.775
Light rails	5.20	5.20	5.20	4.25
<b>Semifinished Steel: (per net ton)</b>				
Re-rolling billets	\$62.00	\$62.00	\$62.00	\$59.00
Slabs, re-rolling	62.00	62.00	62.00	59.00
Forging billets	75.50	75.50	75.50	70.50
Alloy blooms, billets, slabs	82.00	82.00	82.00	76.00
<b>Wire Rod and Skelp: (per pound)</b>				
Wire rods	4.525¢	4.525¢	4.525¢	4.325¢
Skelp	3.75	3.75	3.75	3.55
<b>Finished Steel Composite: (per pound)</b>				
Base price	4.634¢	4.634¢	4.634¢	4.376¢

\* Add 4.7 pct.

## Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

## Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

## Steel Scrap Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

	Feb. 23 1954	Feb. 16 1954	Jan. 26 1954	Feb. 24 1953
<b>Pig Iron: (per gross ton)</b>				
Foundry, del'd Phila.	\$61.19	\$61.19	\$61.19	\$60.69
Foundry, Valley	56.60	56.50	56.50	55.90
Foundry, Southern, Cin'ti	60.43	60.43	60.43	58.93
Foundry, Birmingham	52.88	52.88	52.88	51.88
Foundry, Chicago	56.50	56.50	56.50	55.00
Basic del'd, Philadelphia	60.27	60.27	60.27	59.77
Basic, Valley furnace	56.00	56.00	56.00	54.50
Mallenble, Chicago	56.50	56.50	56.50	55.00
Mallenble, Valley	56.50	56.50	56.50	55.00
Ferromanganese, cents per lb.	10.00¢	10.00¢	10.00¢	8.06¢
† The switching charge for delivery to foundries in the Chicago district is \$1 per ton.				
‡ Average of U. S. Prices quoted on Ferroalloy pages, 76 pct Mn basis.				
<b>Pig Iron Composite: (per gross ton)</b>				
Pig iron	\$56.50	\$56.50	\$56.50	\$55.26
<b>Scrap: (per gross ton)</b>				
No. 1 steel, Pittsburgh	\$24.50	\$26.50	\$29.50	\$44.50
No. 1 steel, Phila. area	23.50	24.50	26.50	44.00
No. 1 steel, Chicago	25.00	25.00	27.00	43.50
No. 1 bundles, Detroit	19.00	20.50	21.50	40.20
Low phos., Youngstown	27.50	29.50	30.50	48.50
No. 1 mach'y cast, Pittsburgh	41.50	41.50	43.50	52.50
No. 1 mach'y cast, Philadel'a.	39.00	39.00	39.00	50.50
No. 1 mach'y cast, Chicago	34.00	34.00	34.50	46.00
<b>Steel Scrap Composite: (per gross ton)</b>				
No. 1 heavy melting scrap	\$24.33	\$25.33	\$27.67	\$44.00
<b>Coke, Connellsville: (per net ton at oven)</b>				
Furnace coke, prompt	\$14.38	\$14.38	\$14.38	\$14.75
Foundry coke, prompt	17.25	17.25	17.25	17.75
<b>Nonferrous Metals: (cents per pound to large buyers)</b>				
Copper, electrolytic, Conn.	29.75‡	29.75‡	29.75‡	24.60
Copper, Lake, Conn.	30.00	30.00	30.00	24.625
Tin, Straits, New York	84.75‡	85.25*	84.75	\$12.14
Zinc, East St. Louis	9.25	9.25	9.50	11.50
Lead, St. Louis	12.30	12.80	12.80	13.80
Aluminum, virgin ingot	21.50	21.50	21.50	20.50
Nickel, electrolytic	63.08	63.08	63.08	63.08
Magnesium, ingot	27.75	27.75	27.75	24.60
Antimony, Laredo, Tex.	28.50	28.50	28.50	34.50
† Tentative. ‡ Average. * Revised.				

## PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem B3...	58.00	58.50	59.00	59.50	.....
Birmingham R3...	52.38	52.88	.....	.....	.....
Birmingham W9...	52.38	52.88	.....	.....	.....
Birmingham S5...	52.38	52.88	.....	.....	.....
Buffalo R3...	56.00	56.50	57.00	.....	.....
Buffalo H1...	56.00	56.50	57.00	.....	.....
Buffalo W6...	56.00	56.50	57.00	.....	.....
Chicago I4...	56.00	56.50	56.50	57.00	.....
Cleveland A5...	56.00	56.50	56.50	57.00	61.00
Cleveland R3...	56.00	56.50	56.50	.....	.....
Dangerfield L3...	52.50	52.50	52.50	.....	.....
Duluth I4...	56.00	56.50	56.50	57.00	.....
Erie I4...	56.00	56.50	56.50	57.00	.....
Everett M6...	.....	63.00	63.50	.....	.....
Fontana K1...	62.00	62.50	.....	.....	.....
Geneva, Utah C7...	56.00	56.50	.....	.....	.....
Granite City G2...	57.90	58.40	58.90	.....	.....
Hubbard Y1...	.....	.....	56.50	.....	.....
Minnequa C6...	58.00	59.00	59.00	.....	.....
Monessen P6...	56.00	.....	.....	.....	.....
Neville Isl. P4...	56.00	56.50	56.50	.....	.....
Pittsburgh U1...	56.00	.....	.....	57.00	.....
Sharpville S3...	56.00	56.50	56.50	57.00	.....
Steelton B3...	58.00	58.50	59.00	59.50	64.00
Swedeland A2...	58.00	58.50	59.00	59.50	.....
Toledo I4...	56.00	56.50	56.50	57.00	.....
Troy, N. Y. R3...	58.00	58.50	59.00	59.50	64.00
Youngstown Y1...	.....	.....	56.50	57.00	.....
N. Tonawanda T1...	.....	56.50	57.00	.....	.....

**DIFFERENTIALS:** Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct), 50¢ per ton for each 0.50 pct manganese over 1 pct, \$2 per ton for .05 to 0.75 pct nickel, \$1 for each additional 0.25 pct nickel. Subtract 35¢ per ton for phosphorus, content 0.70 and over.

**Silvery Iron:** Buffalo, H1, \$68.25; Jackson, J1, G1 \$67.00. Add \$1.50 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add \$1 per ton for 0.75 pct. or more phosphorus. Add 75¢ for each 0.50 pct. manganese over 1.0 pct. Bessemer ferrosilicon prices are \$1 over comparable silvery iron.

## STAINLESS STEEL

Base price cents per lb., f.o.b. mill

Product	301	302	303	304	316	321	347	410	416	430
Ingot, re-rolling	16.25	17.25	18.75	18.25	28.00	22.75	24.50	14.00	.....	14.25
Slabs, billets, re-rolling	20.50-20.75	22.75	24.75	23.75	36.25	29.50	32.25	18.25	.....	18.50
Forg. discs, die blocks, rings	38.50	38.50	41.50	40.50	60.00	45.50	50.75	31.00	31.75	31.75
Billets, forging	29.50	29.75	32.25	31.00	46.50-46.75	35.25	39.50	24.00	24.50	24.50
Bars, wires, structurals	35.25	35.50	38.25	37.25	55.50	42.00	46.75	28.75	29.25	29.25
Plates	37.25	37.50	39.75	39.75	58.75-59.00	45.75-46.00	51.25	30.00	30.50-31.00	30.50
Sheets	46.25	46.50	48.75	48.75	64.50	55.50	60.75	40.75	41.25	43.50
Strip, hot-rolled	29.75	32.00	36.75	34.25	55.00	42.00	46.50	28.25	.....	27.00
Strip, cold-rolled	38.25	41.50	45.50	43.75	66.50	54.50	59.25	34.25	41.25	34.75

**STAINLESS STEEL PRODUCING POINTS—Sheets:** Midland, Pa., C11; Brackenridge, Pa., A3; Butler, Pa., A7; McKeesport, Pa., U1; Washington, Pa., W2, J2; Baltimore, Md., E1; Middletown, O., A7; Massillon, O., R3; Gary, Ind., U1; Bridgeville, Pa., U2; New Castle, Ind., I2; Ft. Wayne, Ind., J4; Lockport, N. Y., R4.

**Strip:** Midland, Pa., C11; Cleveland, A5; Carnegie, Pa., S9; McKeesport, Pa., F1; Reading, Pa., C2; Washington, Pa., W2; W. Leechburg, Pa., A3; Bridgeville, Pa., U2; Detroit, Md., Canton-Massillon, O., R3; Middletown, O., A7; Harrison, N. J., D3; Youngstown, Pa., C3; Lockport, N. Y., S4; Sharon, Pa., S1; Butler, Pa., A7; Wallingford, Conn., W1 (25¢ per lb. higher); New Bedford, Mass., R6.

**Bars:** Baltimore, A7; Duquesne, Pa., U1; Munhall, Pa., U1; Reading, Pa., C2; Titusville, Pa., U2; Washington, Pa., J2; McKeesport, Pa., U1, F1; Bridgeville, Pa., U2; Dunkirk, N. Y., A3; Massillon, O., R3; Chicago, U1; Syracuse, N. Y., C11; Watervliet, N. Y., A3; Waukegan, Ind., A5; Lockport, N. Y., S4; Canton, O., T3; Ft. Wayne, Ind., I4.

**Wire:** Waukegan, Ind., A5; Massillon, O., R3; McKeesport, Pa., F1; Ft. Wayne, Ind., J4; Harrison, N. J., D3; Baltimore, Md., Dunkirk, A3; Monessen, Pa., P1; Syracuse, N. Y., C11; Bridgeville, U2.

**Structurals:** Baltimore, A7; Massillon, O., R3; Chicago, Ill., J4; Watervliet, N. Y., A3; Syracuse, C11.

**Plates:** Brackenridge, Pa., A3; Chicago, U1; Munhall, Pa., U1; Midland, Pa., C11; New Castle, Ind., I2; Lockport, N. Y., S4; Middletown, A7; Washington, Pa., J2; Cleveland, Massillon, R3; Coatesville, Pa., C15.

**Forged discs, die blocks, rings:** Pittsburgh, C11; Syracuse, C11; Ferndale, Mich., A3; Washington, Pa., J2.

**Forging billets:** Midland, Pa., C11; Baltimore, A7; Washington, Pa., J2; McKeesport, F1; Massillon, Canton, O., R3; Watervliet, A3; Pittsburgh, Chicago, U1; Syracuse, C11.

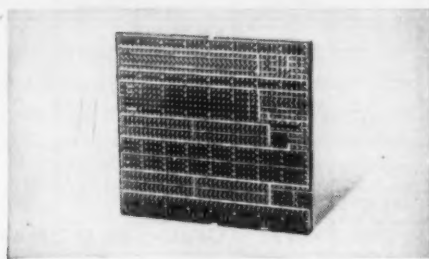
# Make Sure You're Not Missing These Tooling Advantages!

**Make this 3-Minute Check . . . Discover how a modern die steel can give you diemaking and production advantages no other steel offers you!**

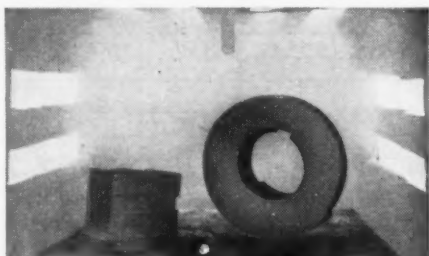
Are you aware of how tool and die steels have been improved in the last 5 to 10 years? New steels are now available that handle easier, run longer between grinds, bring down diemaking costs. Here are facts about

*Vega* (Air-Tough) Die Steel—just one steel in Carpenter's Matched Set of 12 modern die steels. Compare *Vega* and what it offers, with the die steel you're using. Check it point by point. You'll see what a difference a Carpenter Matched Tool and Die Steel can mean to your production and profits. THE CARPENTER STEEL CO., 121 W. Bern St., Reading, Pa.

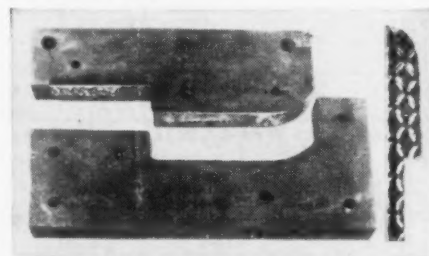
**Here is what *Vega* gives you . . . COMPARE it with the die steel you use . . .**



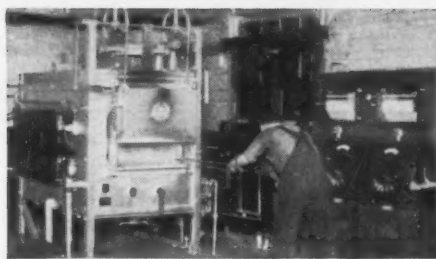
**Freedom from Size Change in Hardening.** The mold for this  $9\frac{1}{2}'' \times 10\frac{1}{2}''$  plastic control panel has 1,280  $\frac{3}{16}''$  dia. holes, six  $\frac{3}{8}''$  dia. horizontal ports for heating and cooling, plus eight  $\frac{3}{4}''$  dia. tapered holes on the edge. *Vega* was the only steel of many tried that could successfully hold the close tolerances of .0002" on centers of the 1,280 holes! Will the steel you use behave in hardening like this?



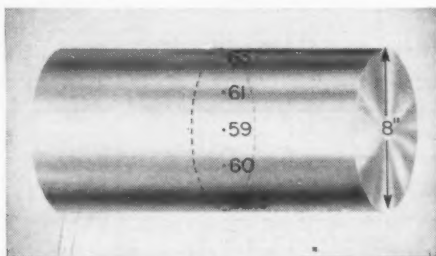
**Extra Economy in Hardening.** Because of *Vega's* lower hardening temperature, troublesome pack hardening to avoid excessive scaling is usually unnecessary. Does the air-hardening steel you use give you this extra economy in hardening?



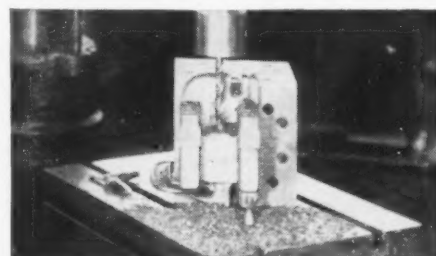
**Toughness with Good Hardness.** This punch and die blanks  $\frac{1}{4}''$  diamond threshold plates at one stroke. With previous air-hardening die steel, tools chipped and broke before any real production was made. With *Vega* these tools are in regular production—and there are no signs of wear or chipping to date. Will the steel you use perform in service like this?



**Easy, Low Temperature Heat Treating.** You heat treat *Vega* from a temperature of only 1550°F (actually 200°F lower than the 5% chromium air-hardening grades!). No need for special, high temperature furnaces! Are you getting the benefits of low temperature heat treating from the air-hardening steel you use?



**Uniform Deep Hardenability.** *Vega* gives you the advantages of uniform, deep hardenability in very heavy sections. For example, *Vega* hardens to Rockwell C-60 from surface to center in sections as large as 8" round. How does the steel you use compare on this score?



**Good Machinability.** Unlike ordinary air-hardening grades, *Vega* has a well balanced analysis with a small percentage of hard-to-machine alloys. Field tests prove it to be one of the easiest of all air-hardening grades to machine. If the air-hardening grade you use fails to provide this good machinability, you're missing out on lower costs.

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Export Department: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"  
Get Immediate Delivery . . . Call your Carpenter Mill-Branch Warehouse, Office or Distributor.

February 25, 1954

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IRON AGE		Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.												
STEEL PRICES (Effective Feb. 23, 1954)		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton		Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled
EAST	Bethlehem, Pa.			\$82.00 B3		4.15 B3	6.20 B3	4.15 B3						
	Buffalo, N. Y.	\$62.00 B3	\$75.50 B3, R3	\$82.00 B3, R3	4.925 B3	4.15 B3	6.20 B3	4.15 B3	3.925 B3, R3	5.45 B3	6.00 B3	8.425 B3		
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.								4.05 A2		5.90 A2			
	New Bedford, Mass.									6.00 R6				
	Harrison, N. J.													12.00 C11
	Johnstown, Pa.	\$62.00 B3	\$75.50 B3	\$82.00 B3		4.15 B3	6.20 B3							
	Morrisville, Pa.													
	New Haven, Conn.									5.90 D1 6.20 A5				
	Phoenixville, Pa.					4.15 P2		4.95 P2						
	Sparrows Pt., Md.								3.925 B3	5.45 B3	6.00 B3	8.425 B3		
	Wallingford, Conn.									5.90 W1				
	Worcester, Mass.									6.30 A5				12.30 A5 12.45 N7
MIDDLE WEST	Alton, Ill.								4.10 L1					
	Ashland, Ky.								3.925 A7					
	Canton-Massillon, Dover, Ohio		\$75.50 R3	\$82.00 R3										12.00 G4
	Chicago, Ill.	\$62.00 U1	\$75.50 R3, U1, W8	\$82.00 U1, W8, R3	4.925 U1	4.10 U1, W8	6.175 U1, Y1	4.10 U1	3.925 A1, W8	5.70 A1	5.95 R3		6.40 W8	
	Sterling, Ill.													
	Cleveland, Ohio		\$75.50 R3							5.45 A5, J3		7.80 J3 8.15 A5		12.00 A5 12.15 N7
	Detroit, Mich.		\$78.50 R5	\$84.00 R5					4.125 G3 4.15 M2	5.65 D1, D2, G3, M2, P11	6.15 G3	7.90 D2 8.35 G3		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	\$62.00 U1	\$75.50 U1	\$82.00 U1, Y1	4.925 J3	4.10 J3, U1	6.175 U1, J3		3.925 J3, U1, Y1	5.70 J3	5.95 U1, J3 6.45 Y1		6.40 U1	
	Granite City, Ill.													
	Kokomo, Ind.													
	Mansfield, Ohio													
	Middletown, Ohio									5.45 A7				
	Niles, Warren, Ohio Sharon, Pa.								3.925 S1	5.45 S1, T4	5.95 S1	7.65 S1	6.40 S1	12.00 S1
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	\$62.00 U1, J3	\$75.50 J3, U1	\$82.00 U1, C11	4.925 U1	4.10 J3, U1	6.175 J3, U1	4.10 U1	3.925 A7, P6 3.95 S7 4.425 S9	5.45 B4, J3, S7		7.80 J3	6.40 S9 6.45 S7	12.00 S9 12.15 S7
	Portsmouth, Ohio													
	Weirton, Wheeling, Follansbee, W. Va.					4.35 W3			3.925 W3	5.45 F3, W3	5.95 W3	8.15 W3		
	Youngstown, Ohio			\$82.00 Y1, C10		4.10 Y1	6.675 Y1		3.925 R3, U1, Y1	5.45 R3, Y1 5.95 C5	5.95 U1, R3 6.45 Y1	7.60 R3 8.30 Y1	6.40 U1	12.00 C5
WEST	Fontana, Cal.	\$70.00 K1	\$83.50 K1	\$101.00 K1		4.75 K1	6.825 K1	5.30 K1	4.70 K1	7.35 K1	7.05 K1		7.80 K1	13.65 K1
	Geneva, Utah		\$75.50 C7			4.10 C7	6.175 C7							
	Kansas City, Mo.					4.80 S2	6.875 S2		4.625 S2		6.65 S2		7.10 S2	
	Los Angeles, Torrance, Cal.		\$94.50 B2	\$102.00 B2		4.80 B2, C7	6.85 B2		4.675 B2, C7	7.50 C1			7.60 B2	
	Minnequa, Colo.					4.55 C6			5.025 C6					
	San Francisco, Niles, Pittsburg, Cal.		\$94.50 B2			4.75 B2 4.91 P9	6.80 B2		4.675 B2, C7					
	Seattle, Wash.		\$94.50 B2, S11			4.85 B2	6.90 B2							
	Atlanta, Ga.								4.175 A8					
SOUTH	Fairfield, Ala. Alabama City, Ala.	\$62.00 T2	\$75.50 T2			4.10 R3, T2	6.175 T2		3.925 R3, T2		5.95 T2			
	Houston, Tex.		\$85.50 S2	\$92.00 S2		4.60 S2			4.425 S2				6.80 S2	

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

IRON AGE

# STEEL PRICES

(Effective Feb. 23, 1954)

SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE	
Hot-rolled 18 ga. & heavier	Cold-rolled	Galvanized 10 ga.	Enameling 12 ga.	Long Terns 10 ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled 19 ga.		Cokes* 1.25-lb. base box	Electro* 0.25-lb. base box	Holloware Enameling 29 ga.	
3.925 B3	4.77 B3				5.90 B3	7.225 B3			4.525 W6				Bethlehem, Pa.
													Buffalo, N. Y.
4.85 A2					5.90 A2					† Special coated mfg. terne deduct 95¢ from 1.25-lb coke base box price. Can-making quality blackplate 55 to 128 lb deduct \$2.20 from 1.25-lb coke base box. * COKES: 1.50-lb add 25¢. ELECTRO: 0.50-lb add 25¢; 0.75-lb add 65¢.			Claymont, Del.
													Coatesville, Pa.
													Conschocken, Pa.
													Harrisburg, Pa.
4.825 U1	4.875 U1								4.525 B3				Hartford, Conn.
										\$8.80 U1	\$7.50 U1		Johnstown, Pa.
													Morrisville, Pa.
													New Haven, Conn.
3.925 B3	4.775 B3	5.275 B3			5.90 B3	7.225 B3	8.075 B3		4.625 B3	\$8.80 B3	\$7.50 B3		Phoenixville, Pa.
									4.825 A5				Sparrows Pt., Md.
													Worcester, Mass.
3.925 A7		5.275 A7	5.175 A7						4.70 L1				Trenton, N. J.
		5.275 R1, R3						5.05 R1					Alton, Ill.
3.925 A1, W3					5.90 U1				4.525 A5, N4,R3				Ashland, Ky.
									4.625 N4				Canton-Massillon, Dover, Ohio
3.925 J3, R3	4.775 J3, R3		5.175 R3		5.90 J3, R3	7.225 J3, R3			4.525 A5				Chicago, Joliet, Ill.
4.125 G3 4.15 M2	4.975 G3				6.10 G3	7.425 G3							Sterling, Ill.
3.925 N5													Cleveland, Ohio
3.925 J3, U1,Y1	4.775 J3, U1,Y1	5.275 U1 5.325 J3	5.175 J3, U1	5.675 U1	5.90 U1, J3 6.40 Y1	7.225 U1 7.725 Y1				\$8.70 J3, U1,Y1	\$7.40 J3, U1	6.10 U1, Y1	Detroit, Mich.
4.125 G2	4.975 G2	5.475 G2	5.875 G2										Newport, Ky.
4.825 C9		5.375 C9						5.025 C9			\$7.60 G2	6.30 G2	Gary, Ind. Harbor, Indiana
				5.675 E2				5.05 E2					Granite City, Ill.
	4.775 A7		5.175 A7	5.675 A7									Kokomo, Ind.
3.925 S1 5.175 N3	5.80 N3	5.275 N3	6.525 N3	5.45 S1 5.675 N3	5.90 S1						\$7.40 R3		Mansfield, Ohio
3.925 J3, U1,P6, A7	4.775 J3, U1,P6	5.275 U1	5.175 U1		5.90 J3, U1	7.225 J3, U1	7.925 U1		4.525 A5 4.725 P6	\$8.70 J3, U1	\$7.40 J3, U1	6.10 U1	Middletown, Ohio
									4.525 P7				Niles, Ohio Sharon, Pa.
3.925 W3, W1	4.775 W3, W5, F3	5.275 W3, W5		5.675 W3, W5	5.90 W3	7.225 W3				\$8.70 W3, W5	\$7.40 W3, W5	6.10 F3, W5	Pittsburgh, Pa. Midland, Pa. Butler, Pa.
3.925 R3, U1,Y1	4.775 R3, Y1				5.90 U1,R3 6.40 Y1	7.225 R3 7.725 Y1			4.525 Y1	\$8.70 R3			Portsmouth, Ohio
4.70 K1	5.875 K1				6.675 K1	8.275 K1			5.325 K1				Weirton, Wheeling, Follansbee, W. Va.
4.825 C7													Youngstown, Ohio
								4.775 C6	4.865 S2				Fontana, Cal.
4.625 C7		6.275 C7							5.325 B2				Geneva, Utah
													Kansas City, Mo.
									4.775 C6				Los Angeles, Torrance, Cal.
4.625 C7	5.725 C7	6.025 C7							5.175 C7	\$9.45 C7	\$8.15 C7		Minnequa, Colo.
													San Francisco, Niles, Pittsburg, Cal.
													Seattle, Wash.
3.925 R3, T2	4.775 T2	5.275 R3, T2			5.90 T2			5.125 T2 5.225 R3	4.525 T2 R3	\$8.80 T2	\$7.50 T2		Atlanta, Ga.
4.425 S2									4.925 S2				Fairfield, Ala. Alabama City, Ala.
													Houston, Texas

## IRON AGE

STEEL  
PRICES(Effective  
Feb. 23, 1954)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	
EAST	Bethlehem, Pa.				4.875 B3	6.325 B3	6.225 B3					
	Buffalo, N. Y.	4.15 B3 4.18 R3	4.15 B3,R3	5.25 B5	4.875 B3,R3	6.325 B3,B5	6.225 B3	4.10 B3			6.25 B3	5.525 W6
	Claymont, Del.							4.10 C4		5.55 C4		
	Coatesville, Pa.							4.10 L4		5.55 L4		
	Conshohocken, Pa.							4.10 A2	5.15 A2		6.25 A2	
	Harrisburg, Pa.							4.10 C3	5.15 C1			
	Hartford, Conn.			5.75 R3		6.775 R3						
	Johnstown, Pa.	4.15 B3	4.15 B3		4.875 B3		6.225 B3	4.10 B3		5.55 B3	6.25 B3	5.525 B3
	Morrisville, Pa.	4.30 U1	4.30 U1		5.025 U1							
	Newark, N. J.			5.65 W10		6.65 W10						
	New Haven, Conn.											
	Camden, N. J.			5.65 P10		6.50 P10						
	Putnam, Conn.			5.75 W10								
	Sparrows Pt., Md.		4.15 B3					4.10 B3		5.55 B3	6.25 B3	5.625 B3
MIDDLE WEST	Palmer, Worcester, Mansfield, Mass.			5.75 B5 6.10 W11		6.775 B5						5.825 A1, W6
	Readville, Mass.			5.75 C14								
	Alton, Ill.	4.35 L1										5.70 L1
	Ashland, Ky.							4.10 A7				
	Canton-Massillon, Ohio	4.15 R3		5.20 R2,R3	4.875 R3, T5	6.325 R2,R3, T5						
	Chicago, Joliet, Ill.	4.15 U1, N4, W8 4.22 R3	4.15 R3,N4	5.20 A5, W10, W8, B5, L2	4.875 U1, W8, R3	6.325 A5, W8, W10, L2, R3, B5		4.10 U1, W8	5.15 U1	5.55 U1	6.25 U1	5.525 A1, R3, N4, W7
	Cleveland, Ohio	4.21 R3	4.15 R3	5.20 A5, C13		6.325 A5, C13		4.10 J3, R3	5.15 J3		6.25 J3	5.525 A5, R3, C13
	Detroit, Mich.	4.30 R5 4.35 G3		5.35 R5, P8 5.40 B5 5.45 P3	4.975 R5 5.075 G3	6.425 R5 6.475 P8 6.525 B5, P3	6.425 G3	4.30 G3			6.45 G3	
	Duluth, Minn.											5.525 A5
	Gary, Ind. Harbor, Crawfordsville	4.15 J3, U1, Y1	4.15 J3, U1, Y1	5.20 R3	4.875 J3, U1, Y1	6.325 R3, M5	6.225 U1, J3 6.725 Y1	4.10 J3, U1, Y1	5.15 J3	5.55 U1	6.25 U1, J3 6.75 Y1	5.625 M4
	Granite City, Ill.							4.30 G2				
	Kokomo, Ind.											5.625 C9
	Sterling, Ill.	4.25 N4	4.25 N4									5.625 N4
	Niles, Ohio Sharon, Pa.							4.10 S1		5.55 S1	6.25 S1	
WEST	Pittsburgh, Pa. Midland, Pa.	4.15 J3, U1	4.15 J3, U1	5.20 A5, J3, W10, R3, C8	4.875 U1, C11	6.325 A5, C11, W10, C8	6.225 J3, U1	4.10 J3, U1	5.15 U1	5.55 U1	6.25 J3, U1	5.525 A5, J3, P6
	Portsmouth, Ohio											5.525 P7
	Weirton, Wheeling, Follansbee, W. Va.	4.15 W3						4.10 W3				
	Youngstown, Ohio	4.15 U1, Y1 4.20 R3	4.15 R3, U1, Y1	5.20 Y1, F2	4.875 U1, Y1, C10	6.325 Y1, C10, F2	6.225 U1 6.725 Y1	4.10 R3, U1, Y1			6.75 Y1	5.525 Y1
	Emeryville, Cal.	4.90 J5	4.90 J5									
	Fontana, Cal.	4.85 K1	4.85 K1		5.925 K1		7.475 K1	4.75 K1		6.60 K1	6.95 K1	
	Geneva, Utah							4.10 C7			6.25 C7	
	Kansas City, Mo.	4.85 S2	4.85 S2		5.575 S2		6.925 S2					6.125 S2
	Los Angeles, Torrance, Cal.	4.85 B2, C7	4.85 B2, C7	6.65 R3	5.925 B2		6.925 B2					6.475 B2
	Minnequa, Colo.	4.60 C6	4.75 C6					4.95 C6				5.775 C6
	Portland, Ore.	4.90 O2										
	San Francisco, Niles, Pittsburg, Cal.	4.85 C7, P9 4.90 B2	4.85 C7, P9 4.90 B2				6.975 B2					6.475 C7
	Seattle, Wash.	4.90 B2, N6	4.90 B2, S11				6.975 B2	5.00 B2			7.15 B2	
SOUTH	Atlanta, Ga.	4.40 A8	4.40 A8									5.725 A8
	Fairfield, Ala. Alabama City, Ala.	4.15 T2 4.18 R3	4.15 R3, T2				6.225 T2	4.10 R3, T2			6.25 T2	5.525 R3, T2
	Houston, Ft. Worth, Lone Star, Tex.	4.55 S2	4.55 S2		5.375 S2			4.50 L3 4.60 S2				5.925 S2



# Steel Prices

(Effective Feb. 23, 1954)

## Key to Steel Producers

With Principal Offices

- A1 Acme Steel Co., Chicago  
A2 Alan Wood Steel Co., Conshohocken, Pa.  
A3 Allegheny Ludlum Steel Corp., Pittsburgh  
A4 American Cladmetals Co., Carnegie, Pa.  
A5 American Steel & Wire Div., Cleveland  
A6 Angell Nail & Chaplet Co., Cleveland  
A7 Armco Steel Corp., Middletown, O.  
A8 Atlantic Steel Co., Atlanta, Ga.  
B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.  
B2 Bethlehem Pacific Coast Steel Corp., San Francisco  
B3 Bethlehem Steel Co., Bethlehem, Pa.  
B4 Blair Strip Steel Co., New Castle, Pa.  
B5 Bliss & Laughlin, Inc., Harvey, Ill.  
C1 Calstrip Steel Corp., Los Angeles  
C2 Carpenter Steel Co., Reading, Pa.  
C3 Central Iron & Steel Co., Harrisburg, Pa.  
C4 Claymont Products Dept., Claymont, Del.  
C5 Cold Metal Products Co., Youngstown  
C6 Colorado Fuel & Iron Corp., Denver  
C7 Columbia Geneva Steel Div., San Francisco  
C8 Columbia Steel & Shifting Co., Pittsburgh  
C9 Continental Steel Corp., Kokomo, Ind.  
C10 Copperweld Steel Co., Pittsburgh, Pa.  
C11 Crucible Steel Co. of America, New York  
C12 Cumberland Steel Co., Cumberland, Md.  
C13 Cuyahoga Steel & Wire Co., Cleveland  
C14 Compressed Steel Shifting Co., Readville, Mass.  
C15 G. O. Carlson, Inc., Thorndale, Pa.  
D1 Detroit Steel Corp., Detroit  
D2 Detroit Tube & Steel Div., Detroit  
D3 Driver Harris Co., Harrison, N. J.  
D4 Dickson Weatherproof Nail Co., Evanston, Ill.  
E1 Eastern Stainless Steel Corp., Baltimore  
E2 Empire Steel Co., Mansfield, O.  
F1 Firth Sterling, Inc., McKeesport, Pa.  
F2 Fitzsimmons Steel Corp., Youngstown  
F3 Follansbee Steel Corp., Follansbee, W. Va.  
G1 Globe Iron Co., Jackson, O.

- G2 Granite City Steel Co., Granite City, Ill.  
G3 Great Lakes Steel Corp., Detroit  
G4 Greer Steel Co., Dover, O.  
H1 Hanna Furnace Corp., Detroit  
I2 Ingersoll Steel Div., Chicago  
I3 Inland Steel Co., Chicago  
I4 Interlake Iron Corp., Cleveland  
J1 Jackson Iron & Steel Co., Jackson, O.  
J2 Jessop Steel Corp., Washington, Pa.  
J3 Jones & Laughlin Steel Corp., Pittsburgh  
J4 Joslyn Mfg. & Supply Co., Chicago  
J5 Judson Steel Corp., Emeryville, Calif.

- K1 Kaiser Steel Corp., Fontana, Cal.  
K2 Keystone Steel & Wire Co., Peoria  
K3 Koppers Co., Granite City, Ill.  
L1 Laclede Steel Co., St. Louis  
L2 La Salle Steel Co., Chicago  
L3 Lone Star Steel Co., Dallas  
L4 Lukens Steel Co., Coatesville, Pa.

- M1 Mahoning Valley Steel Co., Niles, O.  
M2 McLouth Steel Corp., Detroit  
M3 Mercer Tube & Mfg. Co., Sharon, Pa.  
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.  
M5 Monarch Steel Co., Inc., Hammond, Ind.  
M6 Mystic Iron Works, Everett, Mass.  
N1 National Supply Co., Pittsburgh  
N2 National Tube Co., Pittsburgh  
N3 Niles Rolling Mill Div., Niles, O.  
N4 Northwestern Steel & Wire Co., Sterling, Ill.  
N5 Newport Steel Corp., Newport, Ky.  
N6 Northwest Steel Rolling Mills, Seattle  
N7 Newman Crosby Steel Co., Pawtucket, R. I.

- O1 Oliver Iron & Steel Co., Pittsburgh  
O2 Oregon Steel Mills, Portland  
P1 Page Steel & Wire Div., Monessen, Pa.  
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.  
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.  
P4 Pittsburgh Coke & Chemical Co., Pittsburgh  
P5 Pittsburgh Screw & Bolt Co., Pittsburgh  
P6 Pittsburgh Steel Co., Pittsburgh  
P7 Portsmouth Div., Detroit Steel Corp., Detroit

- P8 Plymouth Steel Co., Detroit  
P9 Pacific States Steel Co., Niles, Cal.  
P10 Precision Drawn Steel Co., Camden, N. J.  
P11 Production Steel Strip Corp., Detroit  
R1 Reeves Steel & Mfg. Co., Dover, O.  
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.  
R3 Republic Steel Corp., Cleveland  
R4 Roehling Sons Co., John A., Trenton, N. J.  
R5 Rotary Electric Steel Co., Detroit  
R6 Rodney Metals, Inc., New Bedford, Mass.

- S1 Sharon Steel Corp., Sharon, Pa.  
S2 Sheffield Steel Corp., Kansas City  
S3 Shenango Furnace Co., Pittsburgh  
S4 Simonds Saw & Steel Co., Fitchburg, Mass.  
S5 Sloss Sheffield Steel & Iron Co., Birmingham  
S6 Standard Forging Corp., Chicago  
S7 Stanley Works, New Britain, Conn.  
S8 Superior Drawn Steel Co., Monaca, Pa.  
S9 Superior Steel Corp., Carnegie, Pa.  
S10 Sweet's Steel Co., Williamsport, Pa.  
S11 Seidhuber Steel Rolling Mills, Seattle  
T1 Tonawanda Iron Div., N. Tonawanda, N. Y.  
T2 Tennessee Coal & Iron Div., Fairfield  
T3 Tennessee Products & Chem. Corp., Nashville  
T4 Thomas Strip Div., Warren, O.  
T5 Timken Steel & Tube Div., Canton, O.  
T6 Tremont Nail Co., Wareham, Mass.  
T7 Texas Steel Co., Fort Worth

- U1 United States Steel Corp., Pittsburgh  
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.

- W1 Wallingford Steel Co., Wallingford, Conn.  
W2 Washington Steel Corp., Washington, Pa.  
W3 Weirton Steel Co., Weirton, W. Va.  
W4 Wheatland Tube Co., Wheatland, Pa.  
W5 Wheeling Steel Corp., Wheeling, W. Va.  
W6 Wickwire Spencer Steel Div., Buffalo  
W7 Wilson Steel & Wire Co., Chicago  
W8 Wisconsin Steel Co., S. Chicago, Ill.  
W9 Woodward Iron Co., Woodward, Ala.  
W10 Wyckoff Steel Co., Pittsburgh  
W11 Worcester Pressed Steel Co., Worcester, Mass.

- Y1 Youngstown Sheet & Tube Co., Youngstown

## PIPE AND TUBING

Base discounts (per) f.o.b. mills. Base price about \$280 per net ton.

	BUTTWELD												SEAMLESS							
	1/2 In.		3/4 In.		1 In.		1 1/4 In.		1 1/2 In.		2 In.		2 1/2 In.		3 In.		3 1/2-4 In.			
	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.
STANDARD T. & C.																				
Sparrows Pt. B3	24.25	8.0	27.25	12.0	29.75	15.5	32.25	16.5	32.75	17.5	33.25	18.0	34.75	18.0	.....	.....	.....	.....	.....	.....
Youngstown R3	24.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	.....	.....	.....	.....	.....	.....
Fontana K1	13.25	+2.0	16.25	1.0	18.75	4.5	21.25	5.5	21.75	6.5	22.25	7.0	23.75	7.0	.....	.....	.....	.....	.....	.....
Pittsburgh J3	24.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0
Alton, Ill. L1	24.25	8.0	27.25	12.0	29.75	15.5	32.25	16.5	32.75	17.5	33.25	18.0	34.75	18.0	.....	.....	.....	.....	.....	.....
Sharon M3	24.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	.....	.....	.....	.....	.....	.....
Morrisville N2	24.25	.....	27.25	.....	29.75	.....	32.25	.....	32.75	.....	33.25	.....	34.75	.....	.....	.....	.....	.....	.....	.....
Pittsburgh N1	24.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0
Wooding W5	24.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	.....	.....	.....	.....	.....	.....
Wheatland W4	24.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	.....	.....	.....	.....	.....	.....
Youngstown Y1	24.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0
Indiana Harbor Y1	25.25	9.0	28.25	13.0	30.75	16.5	33.25	17.5	33.75	18.5	34.25	19.0	35.75	19.0	.....	.....	.....	.....	.....	.....
Lorain N2	24.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0
EXTRA STRONG PLAIN ENDS																				
Sparrows Pt. B3	27.75	13.0	31.75	17.0	33.75	20.5	34.25	19.5	34.75	20.5	35.25	21.0	35.75	20.0	.....	.....	.....	.....	.....	.....
Youngstown R3	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	.....	.....	.....	.....	.....	.....
Fontana K1	16.75	.....	20.75	.....	22.75	.....	23.25	.....	23.75	.....	24.25	.....	24.75	.....	.....	.....	.....	.....	.....	.....
Pittsburgh J3	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75
Alton, Ill. L1	27.75	13.0	31.75	17.0	33.75	20.5	34.25	19.5	34.75	20.5	35.25	21.0	35.75	20.0	.....	.....	.....	.....	.....	.....
Sharon M3	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	.....	.....	.....	.....	.....	.....
Pittsburgh N1	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75
Wheeling W5	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	.....	.....	.....	.....	.....	.....
Wheatland W4	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	.....	.....	.....	.....	.....	.....
Youngstown Y1	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75
Indiana Harbor Y1	28.75	14.0	32.75	18.0	34.75	21.5	35.25	20.5	35.75	21.5	36.25	22.0	36.75	21.0	.....	.....	.....	.....	.....	.....
Lorain N2	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75

Galvanized discounts based on zinc, at 1¢ per lb. East St. Louis. For each 1¢ change in zinc, discounts vary as follows: 1/2 in., 3/4 in., and 1 in., 1 pt.; 1 1/4 in., 1 1/2 in., 2 in., 3/4 pt.; 2 1/2 in., 3 in., 1/2 pt. Calculate discounts on even cents per lb. of zinc, i.e., if zinc is 16.5¢ to 17.5¢ per lb., use 17¢. Jones & Laughlin discounts apply only when zinc price changes 1¢. Through only butt-weld and seamless, 2 1/4 pts. higher discount. Plain ends, butt-weld and seamless, 3 in. and under, 4 1/2 pts. higher discount. Butt-weld jobbers' discount, 5 per cent. East St. Louis zinc price now 9.25¢.

# Steel Prices

(Effective Feb. 23, 1954)

## CLAD STEEL

	Plate	Sheet
Stainless-carbon		
No. 304, 20 pct.		
Coatesville, Pa., L4	*32.7	
Washington, Pa., J2		
Claymont, Del. C4		
New Castle, Ind. J2		32.50
Nickel-carbon		
10 pct. Coatesville, Pa. L4	37.5	
Inconel-carbon		
10 pct. Coatesville, Pa. L4	46.10	
Monel-carbon		
10 pct. Coatesville, Pa. L4	38.90	
Aluminized steel sheets, hot dip, Butler, Pa., A7		

\* Includes annealing and pickling, sandblasting.

## ELECTRICAL SHEETS

22 Ga. H-R cut length	Armature	Elec.	Meter	Dynamo	Transf. 72	Transf. 65	Transf. 58
F.a.b. Mill Cents Per Lb.							
Beech Bottom W3	8.75	9.75	10.65	11.60	12.15	12.65	
Brackenridge A3	8.75	9.75	10.65	11.60	12.15	12.65	
Granite City G2	8.60	9.20	10.20				
Ind. Harbor J3	8.15	8.75	9.75				
Mansfield E2	8.15	8.75	9.75	10.65			
Newport, Ky. N3	8.15	8.75	9.75	10.65	11.60		
Niles, O. N3	8.15	8.75	9.75				
Vandergrift U7	8.15	8.75	9.75	10.65	11.60	12.15	12.65
Warren, O. R3	8.15	8.75	9.75				
Zanesville A7	8.15	8.75	9.75	10.65	11.60	12.15	12.65

## TOOL STEEL

F.o.b. Mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	\$1.48
18	4	1	—	5	2.16
18	4	2	—	—	1.64
1.5	4	1.5	8	—	.895
6	4	2	6	—	1.005
High-carbon chromium					.70
Oil hardened manganese					.39
Special carbon					.355
Extra carbon					.30
Regular carbon					.25

Warehouse prices on and east of Mississippi are 3.5¢ per lb. higher. West of Mississippi, 5.5¢ higher.

## CAST IRON WATER PIPE

Per Net Ton

6 to 24-in., del'd Chicago	\$111.80 to \$115.30
6 to 24-in., del'd N. Y.	115.00 to 116.00
6 to 24-in., Birmingham	98.00 to 102.50
6-in. and larger f.o.b. cars, San Francisco, Los Angeles, for all rail shipments; rail and water shipments less	\$129.50 to \$131.50
Class "A" and gas pipe, \$5 extra; 4-in. pipe is \$5 a ton above 6-in.	

## WARE-HOUSES

Cities	City Delivery Charge	Base price, f.o.b., dollars per 100 lb.									
		Sheets		Strip		Plates		Shapes		Bars	
		Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Alloy Bars
Baltimore	\$ .20	6.20	7.64	7.78	7.00			6.85	6.98	6.86	8.17
Birmingham	.15	6.15	7.90	8.04	6.30			6.35	6.35	6.15	8.75
Boston	.20	6.89	7.83	9.18	7.13	9.23-9.35	7.13	7.06	6.87	8.35	12.05
Buffalo	.20	6.20	7.15	9.00	6.65			6.65	6.55	6.35	7.70
Chicago	.20	6.35	7.70	9.01	6.79			6.68	6.59	6.28	7.30
Cincinnati	.15	6.18	7.12	8.00	6.42			6.33	6.46	6.28	7.30
Cleveland	.20	6.51	7.19	8.42	6.72			6.38	6.93	6.58	7.66
Cleveland	.20	6.18	7.12	7.90	6.58			6.60	6.79	6.34	7.40
Denver		7.95	8.85	10.47	8.20	9.55	7.95	7.95	8.05	9.05	16.05
Detroit	.20	6.35	7.29	8.27	6.69	7.36	6.80	6.91	6.56	7.60	11.92
Houston	.20	6.45	7.31		7.71			6.93			
Houston	.20	7.15	7.60	9.40	7.45		7.20		7.45	9.30	12.95
Kansas City	.20	6.85	7.79	8.67	7.09			7.35			
Los Angeles	.20	6.35	7.12	8.00	6.50	8.07	7.05	7.13	6.95	8.08	12.42
Memphis	.10	6.79	7.69		6.90		7.01	7.09	6.88	7.89	11.92
Milwaukee	.20	6.35	7.12	8.00	6.50	8.07	7.05	7.13	6.95	8.08	12.42
New Orleans	.15	6.51	7.41	9.32	6.63	10.42	6.73	6.81	6.60	8.42	14.42
New York	.30	6.78	7.75	8.42	7.16	9.05	6.99	6.90	7.06	8.43	12.29
Norfolk	.20	6.90	8.20	9.00			7.15	7.20	7.20	8.50	12.14
Philadelphia	.25	6.60	7.38	8.15	7.02		6.63	6.67	6.87	8.24	12.04
Pittsburgh	.20	5.95	6.82	7.95	6.20		6.03	6.07	5.98	7.65	11.45
Portland	.10	6.18	7.12	8.00	6.55		6.33	6.46	6.28		11.75
Salt Lake City	.20	7.90	8.45	9.15	7.65		7.30	7.25	7.35	10.65	14.25
San Francisco	.20	9.05	10.80	10.65	9.35	11.25	8.70	8.85	9.10	11.25	13.20
San Francisco	.20	7.35	8.70	9.90	7.60	10.35	7.20	7.25	7.15	9.75	12.80
Seattle	.20	8.15	9.50	10.15	8.00		7.60	7.50	7.60	10.65	13.40
St. Louis	.20	6.48	7.42	8.30	6.72	8.47	6.73	6.86	6.58	7.50	12.20
St. Paul	.15	6.84	7.78	8.66	7.08		6.99	7.12	6.94	8.06	12.05

Base Quantities (Standard unless otherwise keyed): Cold finished bars; 2000 lb or over. Alloy bars; 1000 to 1999 lb. All others; 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets, for quantity. Exceptions: (1) 500 to 1499 lb. (2) 20,000 lb or over. (3) 450 to 1499 lb. (4) 500 to 9999 lb. (5) 1000 lb or over. (6) 400 to 1499 lb.

## MERCHANT WIRE PRODUCTS

F.a.b. Mill	Standard & Coated Nails	Woven Wire Fence 9-15 1/2 ga.	4" x 4" Fence Posts	Single Loop Bale Ties	Twisted Barbed Wire	Galv. Barbed Wire	Merch. Wire Ann'd	Merch. Wire * Galv.
Alabama City R3	131	140	149	153	6.675	7.075		
Aliquippa, Pa. J3	131	143		150	6.675	7.28		
Atlanta A8	133	145	151	158	6.775	7.30		
Bartonville K2	131	143		156				
Buffalo W6								
Chicago, Ill. N4	131	142	149	155	6.675	7.175		
Cleveland A6	137							
Cleveland A5								
Crawford M4	133	145	151	153	6.775	7.325		
Denora, Pa. A5	131	140	149	153	6.675	7.075		
Duluth A5	131	140	145	149	6.675	7.075		
Fairfield, Ala. T2	131	140	149	153	6.675	7.075		
Galveston D4	139	148		164	7.075	7.625		
Houston S2	139	151		156	6.675	7.225		
Johnston, Pa. B3	131	143	145	156	6.675	7.225		
Joliet, Ill. A5	131	140	149	153	6.675	7.075		
Kokomo, Ind. C9	133	142	151	155	6.775	7.175		
Los Angeles B2								
Kansas City S2	143	155	161	168	7.275	7.825		
Minneapolis C6	136	148	150	162	6.925	7.475		
Monessen P6	131	145		157	6.675	7.225		
Moline, Ill. R3			145					
Pittsburg, Cal. C7	156	163	173	173	7.625	8.025		
Portsmouth P7								
Rankin, Pa. A5	131	140		153	6.675	7.075		
So. Chicago R3	131	140	145	149	6.675	7.075		
S. San Fran. C6								
Sparrows Pt. B3	133		151	158	6.775	7.325		
Struthers, O. Y1								
Worcester A5	137				6.675	7.175		
Williamsport, Pa. S10	133		158		6.975			

Cut Nails, carloads, base \$8.00 per keg (less 28¢ to jobbers), at Conshohocken, Pa. (A2).  
\* Alabama City and So. Chicago don't include zinc exts.  
Galvanized products computed with zinc at 11.8¢ per lb.

## C-R SPRING STEEL

Cents Per Lb. F.a.b. Mill	CARBON CONTENT				
	0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Bridgeport, Conn. S7*	5.75	7.65	8.60	10.55	12.65
Carnegie, Pa. S9		7.65	8.60	10.55	12.65
Cleveland A5	5.45	7.65	8.60	10.55	12.65
Detroit D1	5.65	7.85	8.45	10.55	
Detroit D2	5.65	7.85	8.80		
Harrison, N. J. C11		8.90	9.90	10.85	11.15
New Castle, Pa. B4	5.80	8.00	8.60		
New Haven, Conn. D1	5.90	7.95	8.55	10.65	
Riverdale, Ill. A1	5.70	7.80	8.75	10.70	13.00
Sharon, Pa. S1	5.45	7.65	8.60	10.55	12.65
Trenton R4		7.95	8.90	10.85	13.15
Wallingford W1	6.20	7.95	8.90	10.85	13.15
Warren, Ohio T4	5.45	7.65	8.60	10.55	12.65
Weirton, W. Va. W3	5.45	7.65	8.60	10.55	12.65
Worcester, Mass. A5	6.30	7.95	8.90	10.85	13.15
Youngstown C5		8.00	8.60	10.55	12.65

\* Sold on Pittsburgh base.

## BOILER TUBES

\$ per 100 ft. carload lots, cut 10 to 24 ft. F.a.b. Mill	Size		Seamless		Elec. Weld	
	OD-In.	B.W. Ga.	H.R.	C.D.	H.R.	C.D.
Babcock & Wilcox	2	13	27.34	32.98	26.51	31.84
	2 1/2	12	36.82	44.41	35.70	43.67
	3	12	42.52	51.28	41.23	49.73
	3 1/2	11	49.63	59.87	48.13	58.04
	4	10	65.91	79.50	63.92	77.18
National Tube	2	13		32.98	26.51	
	2 1/2	12	36.82	44.41	35.70	
	3	12	42.52	51.28	41.23	
	3 1/2	11	49.63	59.87	48.13	
	4	10	65.91	79.50	63.92	
Pittsburgh Steel	2	13	27.34	32.98		
	2 1/2	12	36.82	44.41		
	3	12	42.52	51.28		
	3 1/2	11	49.63	59.87		
	4	10	65.91	79.50		

# Miscellaneous Prices

(Effective Feb. 23, 1954)

## RAILS, TRACK SUPPLIES

Fab. Mill Cents Per Lb	No. 1 Sid Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer U1	4.325	5.20	5.275	7.05			
Chicago R3							
Cleveland R3	4.325	5.20					
Insley T2		5.20				5.125	
Fairfield T2	4.325	5.20				5.125	
Gary U1	4.325		5.275	7.05		5.125	
Ind. Harbor B3		5.20					
Johnstown B3		5.20	5.275				
Joliet U1		5.20	5.275				
Kansas City S2				7.30			11.00
Lackawanna B3	4.325	5.20	5.275			5.125	
Lebanon B3				7.05	10.50		11.00
Minnesota C6	4.325	5.70	5.275	7.05		5.125	11.00
Pittsburgh O1					10.50		11.00
Pittsburgh P5				7.05			
Pittsburgh J3						5.275	
Port, Cal. C7				7.55		5.275	11.50
Seattle B2							
Steele B3	4.325		5.275			5.125	
Struthers Y1							
Terrance C7						5.275	
Tonguepoint R3				7.05			

## LAKE SUPERIOR ORES

51.50% Fe; natural content, delivered lower Lake ports. Prices effective July 1, 1953, to end of 1954 season.

	Gross Ton
Openhearth lump	\$11.15
Old range, bessemer	10.30
Old range, nonbessemer	10.15
Mesabi, bessemer	10.05
Mesabi, nonbessemer	9.90
High phosphorus	9.90

Prices based on upper Lake rail freight rates, Lake vessel freight rates, handling and unloading charges, and taxes thereon, in effect on June 24, 1953. Increases or decreases after such date are for buyer's account.

## COKE

	Net-Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	\$14.25 to \$14.50
Pondry, beehive (f.o.b. oven)	
Connellsville, Pa.	\$16.50 to \$17.00
Pondry, oven coke	
Buffalo, del'd	\$22.08
Chicago, f.o.b.	24.50
Detroit, f.o.b.	25.50
New England, del'd	26.05
Seaboard, N. J., f.o.b.	24.00
Philadelphia, f.o.b.	23.95
Swedeland, Pa., f.o.b.	23.85
Painesville, Ohio, f.o.b.	24.00
Erie, Pa., f.o.b.	25.00
Cleveland, del'd	27.43
Cincinnati, del'd	26.56
St. Paul, f.o.b.	23.75
St. Louis, f.o.b.	26.00
Birmingham, del'd	23.21
Lone Star, Tex., f.o.b.	18.50

## ELECTRODES

Cents per lb, f.o.b. plant threaded electrodes with nipples, unboxed

Diam. in in.	Length in in.	Cents Per lb.
GRAPHITE		
24	84	30.50
20	72	30.00
12, 14, 18	72	20.50
7 to 10	60	21.00
6	60	23.25
4	40	26.00
3	40	27.25
2 1/2	30	28.00
2	24	43.50
CARBON		
40	100, 110	8.95
35	110	8.95
30	110	8.95
24	72 to 84	9.10
20	90	8.95
17	72	9.10
14	72	9.50
10, 12	60	10.30
8	60	10.55

## BOLTS, NUTS, RIVETS, SCREWS

### Consumer Prices

(Base discount, f.o.b. mill, Pittsburgh, Cleveland, Birmingham or Chicago)

### Nuts, Hot Pressed, Cold Punched—Sq.

	Pct Off List	Less Keg	Reg.	Less Keg	K.
1/2 in. & smaller	+2	15		+2	18
9/16 in. & 5/8 in.	+7	11		+32*	+10*
3/4 in. to 1 1/2 in.					
inclusive	+8	10		+27**	+6**
1 1/2 in. & larger	+9	9		+27	+6
9/16 to 3/4 in.					
** 3/4 to 1 1/2 in.					

### Nuts, Hot Pressed—Hexagon

1/2 in. & smaller	11	26	8	23
9/16 in. & 5/8 in.	2	18	+20	net
3/4 in. to 1 1/2 in.				
inclusive	+6	12	+25	+4
1 1/2 in. & larger	+8	10	+25	+4

### Nuts, Cold Punched—Hexagon

1/2 in. & smaller	11	26	8	23
9/16 in. & 5/8 in.	9	24	+2	16
3/4 in. to 1 1/2 in.				
inclusive	+1	16	+9	9
1 1/2 in. & larger	+16	3	+20	net

### Nuts, Semi-Finished—Hexagon

1/2 in. & smaller	23	36	14	28
9/16 in. & 5/8 in.	18	32	4	30
3/4 in. to 1 1/2 in.				
inclusive	8	23	+8	10
1 1/2 in. & larger	+14	5	+20	net
7/16 in. & small-				
er	33	43		
1/2 in. thru 3/4 in.	26	37		
3/4 in. to 1 1/2 in.				
inclusive	18	30		

### Stove Bolts

	Pct Off List
Packaged, steel, plain finished	44 1/2—10
Packaged, plain finish	25 1/2—10
Bulk, plain finish**	59*

\*Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

\*\*Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

### Rivets

	Base per 100 lb
1/2 in. & larger	\$3.90
7/16 in. and smaller	30

### Cap and Set Screws

	Pct Off List
(In bulk)	
Hexagon head cap screws, coarse or fine thread, 1/4 in. thru 3/4 in. x 6 in., SAE 1020, bright	40
3/4 in. thru 1 in. up to & including 6 in.	26
1/2 in. thru 3/4 in. x 6 in. & shorter	
high C double heat treat	43
3/4 in. thru 1 in. up to & including 6 in.	23
Milled studs	17
Flat head cap screws, listed sizes	12
Fillister head cap, listed sizes	7
Set screws, sq head, cup point, 1 in. diam. and smaller x 6 in. & shorter	37

### Machine and Carriage Bolts

	Pct Off List	Less Case	C.
1/2 in. & smaller x 6 in. & shorter		4	20
9/16 in. & 5/8 in. x 6 in. & shorter		5	21
3/4 in. & larger x 6 in. & shorter		3	19
All diam. longer than 6 in.	+4	13	
Lag, all diam. x 6 in. & shorter		12	27
Lag, all diam. longer than 6 in.		8	23
Plow bolts		30	

## REFRACTORIES

### Fire Clay Brick

	Carloads per 1000
First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add \$5.00)	\$109.00
No. 1 Ohio	102.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	102.00
No. 2 Ohio	93.00
Ground fire clay, net ton, bulk (except Salina, Pa. add \$1.50)	16.00

### Silica Brick

Mt. Union, Pa., Ensley, Ala.	\$115.00
Childs, Hays, Pa.	120.00
Chicago District	125.00
Western Utah	131.00
California	138.00
Super Duty	
Hays, Pa., Athens, Tex., Wind-	
ham	132.00
Curtner, Calif.	150.00
Silica cement, net ton, bulk, East-	
ern (except Hays, Pa.)	19.00
Silica cement, net ton, bulk, Hays,	
Pa.	21.00
Silica cement, net ton, bulk, Chi-	
cago District, Ensley, Ala.	20.00
Silica cement, net ton, bulk, Utah	
and Calif.	28.50

### Chrome Brick

	Per net ton
Standard chemically bonded Balt.	\$86.00
Standard chemically bonded, Curt-	
ner, Calif.	96.25
Burned, Balt.	80.00

### Magnesite Brick

Standard Baltimore	\$109.00
Chemically bonded, Baltimore	97.50

### Grain Magnesite

	St. % -in. grains
Domestic, f.o.b. Baltimore	
in bulk fines removed	\$64.40
Domestic, f.o.b. Chewalah, Wash.,	
Luning, Nev.	38.00
in bulk	43.75
in sacks	

### Dead Burned Dolomite

	Per net ton
F.o.b., bulk, producing points in:	
Pa., W. Va., Ohio	\$14.50
Midwest	14.60
Missouri Valley	13.65

## FLUORSPAR

Washed gravel, f.o.b. Rosiclare, Ill.	
Price, net ton; Effective CaF <sub>2</sub> content	
72 1/2 %	\$44.00
70 % or more	42.50
60 % or less	38.00

## METAL POWDERS

	Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.
Swedish sponge iron, c.i.f.	
New York, ocean bags	11.25¢
Canadian sponge iron, del's.	
in East	12.0¢
Domestic sponge iron, 98+ %	
Fe, carload lots	18.0¢
Electrolytic iron, annealed,	
99.5+ % Fe	44.0¢
Electrolytic iron, unannealed,	
minus 325 mesh, 99+ % Fe	60.0¢
Hydrogen reduced iron minus	
300 mesh, 98+ % Fe.	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10	
micron, 98%, 99.8+ % Fe.	83.0¢ to \$1.48
Aluminum	31.5¢
Brass, 10 ton lots	29.50¢ to 36.50¢
Copper, electrolytic	43.50¢
Copper, reduced	43.50¢
Cadmium, 100-199 lb 95% plus metal value	
Chromium, electrolytic, 99%	
min., and quality, del'd.	33.60
Lead	21.75¢
Manganese	57.0¢
Molybdenum, 99%	32.75
Nickel, unannealed	89.50¢
Nickel, annealed	96.50¢
Nickel, spherical, unannealed	93.50¢
Silicon	43.50¢
Solder powder, 7.0¢ to 9.0¢ plus met. value	
Stainless steel, 302	91.0¢
Stainless steel, 316	11.10
Ti	14.04¢ plus metal value
Tungsten, 99% (65 mesh)	55.35
Zinc, 10 ton lots	17.5¢ to 25.0¢



# Ferroalloy Prices

(Effective Feb. 23, 1954)

## Ferrochrome

Contract prices, cents per lb contained Cr, lump size, bulk, in carloads, delivered.  
65-72 Cr, 2% max. Si  
0.025% C ... 34.50 0.20% C ... 23.50  
0.06% C ... 34.50 0.50% C ... 23.25  
0.10% C ... 34.00 1.00% C ... 23.00  
0.15% C ... 33.75 2.00% C ... 22.75  
65-69% Cr, 4.9% C ... 24.75  
62-66% Cr, 4.6% C, 6-9% Si ... 25.60

## S. M. Ferrochrome

Contract price, cents per pound, chromium contained, lump size, delivered.  
High carbon type: 69.65% Cr, 4-6% Si, 4-6% Mn, 4-6% C  
Carloads ... 25.85  
Ton lots ... 28.00  
Less ton lots ... 23.50

## High-Nitrogen Ferrochrome

Low-carbon type 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 3¢ for each additional 0.25% of N.

## Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.  
0.10% max. C ... \$1.18  
0.50% max. C ... 1.14  
9 to 11% C ... 1.11

## Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-49%, C 0.05% max.)  
Contract price, carloads, f.o.b. Niagara Falls, freight allowed, lump 4-in. x down, bulk 2-in. x down, 24.75¢ per lb of contained Cr plus 12.40¢ per lb of contained Si.  
Bulk 1-in. x down, 24.90¢ per lb contained Cr plus 12.69¢ per lb contained Si.

## Calcium-Silicon

Contract price per lb of alloy, lump delivered.  
30-33% Cr, 60-65% Si, 3.00% max. Fe.  
Carloads ... 19.00  
Ton lots ... 22.10  
Less ton lots ... 23.60

## Calcium-Manganese-Silicon

Contract prices, cents per lb of alloy lump, delivered.  
16-20% Ca, 14-18% Mn, 53-59% Si.  
Carloads ... 20.00  
Ton lots ... 22.30  
Less ton lots ... 23.30

## SMZ

Contract price, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.  
Ton lots ... 17.50  
Less ton lots ... 19.50

## V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn.  
Ton lots ... 16.50  
Less ton lots ... 17.75

## Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.  
Carload packed ... 17.50  
Ton lots to carload packed ... 18.50  
Less ton lots ... 20.00

## Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 75 pct Mn; Cents per-lb  
Producing Point  
Marietta, Ashtabula, O.; Alloy  
W. Va.; Sheffield, Ala.; Portland  
Ore. ... 10.00  
Clairton, Pa. ... 10.00  
Sheridan, Pa. ... 10.00  
Add or subtract 0.1¢ for each 1 pct Mn above or below base content.  
Briquets, delivered, 86 pct Mn:  
Carloads, bulk ... 12.50  
Ton lots, packed ... 14.05

## Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.  
Manganese Silicon  
16 to 19% 3% max. ... \$84.00  
19 to 21% 3% max. ... 86.00  
21 to 23% 3% max. ... 88.50  
23 to 25% 3% max. ... 91.00

## Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.  
95.50% min. Mn, 0.1% max. C, 1% max. Si, 2.5% max. Fe.  
Carload, packed ... 36.95  
Ton lots ... 38.45

## Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.  
Carloads ... 31.50  
Ton lots ... 32.50  
Less ton lots ... 35.50  
Premium for hydrogen-removed metal ... 1.50

## Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn ... 21.35¢

## Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.  
Carloads Ton Less  
0.07% max. C, 0.06% P, 90% Mn ... 30.00 31.85 33.05  
0.07% max. C ... 27.95 29.80 31.00  
0.15% max. C ... 27.45 29.30 30.50  
0.30% max. C ... 26.95 28.80 30.00  
0.50% max. C ... 26.45 28.30 29.50  
0.75% max. C, 80-85% Mn, 5.0-7.0% Si ... 23.45 25.30 26.50

## Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢.  
Carload bulk ... 11.40  
Ton lots ... 13.05  
Briquet contract basis carlots, bulk delivered, per lb of briquet ... 12.65  
Ton lots, packed ... 14.25

## Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., \$92.00 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$89.50. Add \$1.00 per ton for each additional 0.50% Si up to and including 17%. Add \$1.45 for each 0.50% Mn over 1%.

## Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.  
Ton Lots Carloads  
96% Si, 2% Fe ... 20.10 18.00  
97% Si, 1% Fe ... 20.60 18.50

## Silicon Briquets

Contract price, cents per pound of briquet bulk, delivered, 40% Si, 2 lb Si briquets.  
Carloads, bulk ... 6.95  
Ton lots ... 8.55

## Electric Ferrosilicon

Contract price, cents per lb contained Si, lump, bulk, carloads, delivered.  
25% Si ... 20.00 75% Si ... 14.30  
50% Si ... 12.40 85% Si ... 15.55  
65% Si ... 13.60 90.95% Si ... 17.00

## Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.  
Cast Turnings Distilled  
Ton lots ... \$2.05 \$2.95 \$3.75  
Less ton lots ... 2.40 3.30 4.55

## Ferrovandium

35-55% contract, basis, delivered, per pound, contained V.  
Openhearth ... \$3.00-\$3.10  
Crucible ... 3.10-3.20  
High speed steel (Primus) ... 3.20-3.25

Alsiifer, 20% Al, 40% Si, 40% Fe, contract basis f.o.b. Suspension Bridge, N. Y.  
Carloads ... 9.90  
Ton lots ... 11.30  
Calcium molybdate, 46.3-46.6% f.o.b. Langeloth, Pa., per pound contained Mo. ... \$1.15  
Ferrocolumbium, 50-60% 2 in. x D contract basis, delivered per pound contained Cb.  
Ton lots ... \$6.40  
Less ton lots ... 6.45  
Ferro-Tantalum-Columbium, 20% Ta, 40% Cb, 0.30% C. Contract basis, delivered, ton lots, 2 in. x D, per lb of contained Cb plus Ta ... \$4.75  
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo. ... \$1.32  
Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$4.00 unitage, per gross ton ... \$90.00  
10 tons to less carload ... \$110.00  
Ferrotitanium, 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti ... \$1.25  
Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti ... \$1.50  
Less ton lots ... 1.55  
Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton ... \$177.00  
Ferrotungsten, ¼ x down, packed, per pound contained W, ton lots, f.o.b. ... \$2.80  
Molybdc oxide, briquets or cans, per lb contained Mo, f.o.b. Langeloth, Pa. ... \$1.14  
bags, f.o.b. Washington, Pa., Langeloth, Pa. ... \$1.13  
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound  
Carload, bulk lump ... 14.50¢  
Ton lots, bulk lump ... 15.75¢  
Less ton lots, lump ... 16.35¢  
Vanadium Pentoxide, 96-99% V<sub>2</sub>O<sub>5</sub> contract basis, per pound contained V<sub>2</sub>O<sub>5</sub> ... \$1.25  
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.  
Ton lots ... 21.00¢  
Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy.  
Carload, bulk ... 1.00¢  
Boron Agents  
Borasil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B, 3-4% Si, 40-45%, per lb contained B ... \$5.25  
Bortam, f.o.b. Niagara Falls  
Ton lots, per pound ... 45¢  
Less ton lots, per pound ... 50¢  
Corbortam, Ti 15-21%, B, 1-2%, Si, 2-4%, Al, 1-2%, C, 4.5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed.  
Ton lots per pound ... 10.00¢  
Ferroboreon, 17.50% min B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, Ton lots ... \$1.20  
F.o.b. Wash., Pa.; 100 lb up  
10 to 14% B ... 1.20  
14 to 10% B ... 1.20  
19% min. B ... 1.50  
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over  
No. 1 ... \$1.00  
No. 6 ... 68¢  
No. 79 ... 50¢  
Manganese-Boron, 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd  
Ton lots ... \$1.40  
Less ton lots ... 1.57  
Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered  
Less ton lots ... \$2.85  
Silcaz, contract basis, delivered  
Ton lots ... 45.00¢